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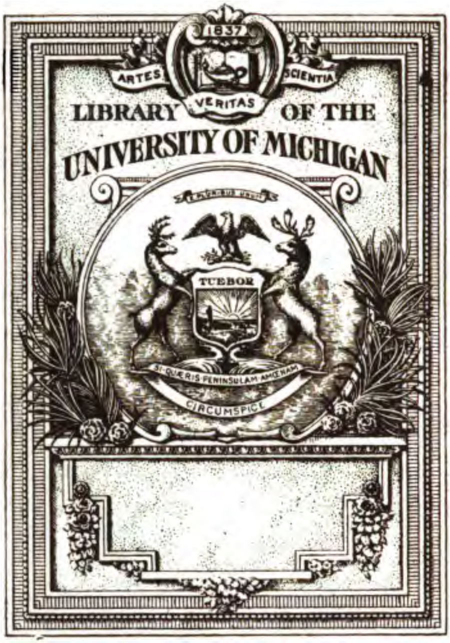

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THE LONDON JOURNAL OF Arts and Sciences; AND REPERTORY OF PATENT INVENTIONS.

CONDUCTED

BY W. NEWTON,

CIVIL ENGINEER AND MECHANICAL DRAFTSMAN.

(Assisted by several Scientific Gentlemen.)

VOL. VI.

(CONJOINED SERIES.)

London:

PUBLISHED BY SHERWOOD, GILBERT, AND PIPER, PATERNOSTER ROW; SIMPKIN AND MARSHALL, STATIONERS' COURT; AND W. NEWTON, OFFICE FOR PATENTS, 66, CHANCERY LANE; AND BENNIS, RUE NEUVE, ST. AUGUSTIN, PARIS.

1835.

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CUNNINGHAM AND SALMON, PRINTERS, CROWN-COURT,
FLEET-STREET.

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LIST OF PLATES IN VOL. VI.

CONJOINED SERIES.

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To the Readers of the "London Journal of Arts and Sciences and Repertory of Patent Inventions."

In carrying on a literary war with any contemporary where our own interest alone was involved, we have always considered it enough to impose upon our subscribers the penalty of reading without calling upon them to pay for that which they might think little, if at all, concerned them; such matters have therefore been generally discussed by us on our own ground—the WRAPPER. The subject, however, at present to be introduced demanding a greater space for its development than our wrapper will conveniently afford, and being upon a topic which we feel imperatively called upon to place before our readers, we have appropriated to its consideration an extra half-sheet, in order that we may, in some degree, compensate for its intrusion.

In commencing our present conjoined series of the "London Journal of Arts and Repertory of Patent Inventions," we announced that we had purchased of Mr. W. H. Wyatt, the proprietor of the original periodical called "The Repertory of Arts and Repertory of Patent Inventions," the entire copyright of that work, first, second, and third series, with all the copper-plates.

We observed at that time, that another periodical was in course of publication, called "The Repertory of Patent Inventions," which was got up by some anonymous parties, who had no connexion with the original work, of which we were the sole proprietors.

These observations have from time to time been repeated by us, in the full conviction that we alone possessed the legal right; but after a lapse of three years, when we have arrived in the middle of the sixth volume of our conjoined series, Mr. Hodson, of Cross-street, Hatton-garden, the printer of a new series of "The Repertory of Patent Inventions," comes forward to accuse us of libel and piracy, disputing our title to the name "Repertory

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of Patent Inventions;" and producing a deed of assignment from Mr. W. H. Wyatt, of the number of the "Repertory" for January, 1830, with the right to continue a publication under that title.

In one of our lucubrations, we said that a periodical, under the title of "The Repertory of Patent Inventions," had been "*foisted upon the public by an anonymous editor, as a continuation of the original work, with which it had no connexion whatever.*" Now, though we at that time conceived that we spoke the literal truth, yet, upon finding our error, we are perfectly ready to acknowledge Mr. Hodson's right to publish "The Repertory of Patent Inventions" from the beginning of the year 1830; but we do not so clearly see his right to claim the exclusive continuation of an original work, of which we undoubtedly hold the copyright.

Under these circumstances, in order to avoid, if possible the expense of litigation, we agreed to insert an apology for these unsavoury expressions, and, in consequence, received from the solicitor of Mr. Hodson a note, dictating the terms in which we were to express our recantation, which were as follows:—"The proprietors of this Journal have to regret that there should have appeared in the preface to vol. ix., in a note at page 6, the following passage:—A periodical, under the title of 'Repertory of Patent Inventions,' has been subsequently foisted upon the public, by some anonymous editor, as a continuation of the original work, but with which it has no connexion whatever; the entire copyright of the 'Repertory,' *first, second,* and *third* series, having been sold by Mr. W. H. Wyatt to the proprietors of the 'London Journal of Arts;' and in the bills attached to the numbers for December, 1834, and January, 1835, the following:—'This work forms a continuation, on an enlarged plan, of the original 'Repertory of Arts and Manufactures,' the entire copyright of which has been purchased of Mr. W. H. Wyatt, by the proprietors of the 'London Journal of Arts,' and the works accordingly associated in the present 'Conjoined Series.' It should be observed, that a periodical, at present publishing under

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the title of the 'Repertory of Patent Inventions,' by an anonymous editor, has no connexion whatever with the original work.'"

"These passages were inserted under an idea the proprietors then entertained, that, in having purchased all the interest of Mr. W. H. Wyatt (which they did in April, 1832), they had become the proprietors of the whole work. The proprietor of the 'Repertory' has, however, satisfied them that Mr. Hinde, the party through whom he claims, had previously purchased the copyright of the work from January, 1830; and that Mr. Wyatt's interest, sold to the proprietors of the 'London Journal,' extended from the commencement of the work in 1794, to December, 1829, only.

"The proprietor of the 'Repertory' has, however, consented, that for the sake of uniformity the title of this Journal shall continue as it is until the present volume is completed, which is expected to be in July or August next." To this we added—

"The last clause refers to some contemplated modification of the title of the Journal, in order that it may not appear to be a continuation of Mr. Hodson's 'Repertory,' of which it certainly is not a continuation."

This apology, *verbatim*, with the explanation above merely to render it intelligible, was inserted word for word on the wrapper of our June number as a "peace-offering;" and in order to avoid the trouble and interruption to business which our personal attendance in supporting our legal defence to an action would inevitably occasion, we handed to Mr. Hodson's solicitor the amount of his pretended costs. Here we considered the matter had finally closed, having made that necessary apology for expressions which, on our becoming acquainted with the fact of Mr. Hodson's identity with the proprietors of the "New Repertory," we admit might be felt as personally offensive; but the reader may judge of the justice of Mr. Hodson's complaint, and of our surprise on discovering, after the above arrangement had been made, in a number of the "New Repertory," which had never before come under our observation, though published several months previous to our *libellous* attack, the following "address from the proprietor," on the completion of the first volume of his New Series, who, after stating that he

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had "secured the co-operation, as editor, of a gentleman especially qualified," &c., and that "this volume may be taken as a specimen of the plan on which the work will in future be conducted." It goes on to say,

"A few words are now requisite on the subject of the legal proprietorship of the copyright of the 'Repertory of Patent Inventions,' &c. &c. Much falsehood and misrepresentation having been published on this point, it becomes necessary to apprise the subscribers, in order to prevent their being imposed upon, that the copyright is vested by deed of assignment in the present proprietors, and that the original assignment is from Mr. Wyatt, the first proprietor and publisher of the 'Repertory of Arts;' and having been so assigned to the present proprietor, any other publication purporting to be a 'continuation of the 'Repertory of Arts,'' purports to be what it *is not*, and an attempt is thus made by its conductors to foist upon the public a spurious for a genuine work. Neither has the 'Repertory of Patent Inventions' ever been united with any other work, although a direct offer to that effect was made to the present proprietor a few months since, but which was immediately rejected. Any publication, therefore, professing to be 'conjoined' with this work, professes what is false, and its conductors are thus attempting to impose upon the public, and under the credit of being conjoined with the '*Repertory of Patent Inventions*,' are endeavouring to gain a circulation for that which might otherwise fail to attract the least attention. But enough: the proprietor of the 'Repertory of Patent Inventions' is satisfied that this work will bear the test of comparison with any other publication having a similar object in view; the specifications it contains *are true copies from the originals*, and the drawings are given with the minutest care; *and its editor has never yet found it necessary to fill his pages month after month with specifications and drawings plundered from a contemporary publication.*"

This unassuming address containing such an accurate statement of facts, and intending to be a very smart castigation for us, needs but little comment, its main features have been sufficiently answered above. The bold assertions, however, made in this address, that no other person besides Mr. Hodson had any interest in or

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connexion with the original "Repertory of Arts," or subsequent "Repertory of Patent Inventions," is, by the apology dictated from Mr. Hodson to us, proved to be a barefaced falsehood, as it is there acknowledged "that Mr. Wyatt's interest sold to the proprietors of the 'London Journal' extended from the commencement of the work in 1794, to December, 1829, only;" and it should have been added, though that of course follows, that Mr. Hodson's interest in the work *commenced only* at that period.

With reference to the last clause of the address, we take the liberty of saying, that whatever the present anonymous editor (we beg pardon, we mean the editorial gentleman, who, for obvious reasons, chooses to be nameless) may intend to do, we know not; but that the previous anonymous editor, to whom our former remarks were intended to allude, did plunder us wholesale in every number that he sent into the world, would, on comparing the works and their dates, be too obvious to need insisting upon.

We do not attempt to impose upon our readers a fallacious profession, that in the specifications inserted in our volumes, "great care has been exercised, and no expense spared in procuring the most valuable and interesting:" nor do we fill our pages with a selection of subjects, the choice of which is determined by accident, convenience, and economy, but we give the specifications, or ample descriptions of the WHOLE OF THE INVENTIONS *which are made the subjects of* PATENT RIGHT, as early as we can introduce them, conceiving that a Repertory of Patent Inventions can only be useful as a book of reference, by containing descriptions of all inventions for which patents are granted. This we have done in our first and second series of the "London Journal of Arts," which contains, without one exception, the details of every invention patenteed from the beginning of the year 1820 to 1830, nearly fifteen hundred in the whole. The same plan we are continuing to pursue in our present conjoined series, and in a new edition of the original Repertory, which we have in preparation, we intend giving a description of every invention contained in that valuable work, with the original plates, and such other matter as shall form a complete history of inventions, from the latter part of the last century up to the com-

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mencement of our Journal, so as to place before the public, in our pages, a complete and continued series of all inventions patented in this kingdom.

It is scarcely necessary to say, that had we been aware of the piece of abuse thrown at us in this address to the readers of the New Repertory, we should have blushed for our own weakness, in contemplating for one moment the admission of an apology, or have stooped to the slightest concession; we should have allowed Mr. Hodson to go on with his action for libel, convinced that, with such an unqualified discharge of insolence and falsehood, preceding our slip of the pen, that a nonsuit must have superseded the farthing damages which he might have obtained had he gone into court with clean hands.

Not satisfied, however, with the apology, Mr. Hodson has employed his solicitor, a Mr. Archibald Rosser, to write him a long letter, informing Mr. Editor of the New Repertory that we had printed something beside his apology, and had also presumed to leave out the word *kindly*, in reference to his "*kindly*" permitting us to use the name of Repertory to the end of our present volume. With this erudite and valuable piece of information, the number of the New Repertory of Patent Inventions, for July, is commenced, occupying nine pages, where we have the honour of being noticed, for the first time in that work, under our *propria nomine*, as Mr. William Newton, editor and proprietor of the "London Journal," never having before dared to drop the slightest hint to their subscribers that such a person or work existed.

In this interesting letter, Mr. Archibald Rosser makes a doleful complaint, that (in one instance, which occurred more than two years ago,) we were guilty of pirating no less than *nine orthographical blunders* from his work: we knew it, and made no hesitation in acknowledging the fact as soon as it was pointed out. Was any periodical ever known to commit such a crying offence before? On that occasion, as the devil would have it—(we mean the printer's devil) at the eleventh hour, a page of matter was wanting to fill up a blank in our forthcoming Journal, and in our absence some one indiscreetly tore out two short

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articles from an odd number of the Repertory, and so supplied the chasm: certainly not much to the credit either of Mr. Hodson or our printer. What an escape we then had! for Mr. Hodson appears to have entertained serious intentions of prosecuting us; but it so happened that his friend Mr. Archibald Rosser could not prove copyright to any other part of the matter except to the blunders. But, says Mr. Archibald Rosser, "bye and bye, as I expected would be the case, Mr. Newton ventured further, he presumed to say that he ALONE had the right to use the title of REPERTORY, &c., and he libelled Mr. Hodson's periodical with a view to prejudice its sale. I firmly believe he knew all the time that he had no more right to give to the 'London Journal' the title of Repertory, &c., than he had to apply to his map-shop in Chancery-lane, the designation of *the Office for Patents*, he holding no more than a private chamber, like many others, to which inventors might or might not resort for assistance."

The whole subject under discussion will now be pretty well understood by our readers; but it may be asked, why has Mr. Archibald Rosser attacked the "map-shop in Chancery-lane?" (alluding to the business of land surveyors and civil engineers, which has been carried on by the house for more than three quarters of a century, in connexion with the mechanical drawing department of the Offices for Inrolling Specifications of Patents in Chancery.) The simple reason is this—there is *not in existence any one* PUBLIC OFFICE FOR PATENTS *under the authority of the Government*. The grants of patents pass through a series of stages, of offices and of officers, several of which are changeable with the political changes of ministry; therefore the assistance of an experienced agent is necessary to procure Letters Patent for inventions: that assistance we respectfully offer to inventors at our Office for Patents in Chancery-lane. The offices of one of these patent agents, not far from our own, who like Mr. Hodson, wishes to be thought "the only real lion," is rather closely connected with the editorship of Mr. Hodson's New Repertory, and, if we mistake not, ~~forms the main~~ crutch upon which the New Repertory finds support. Beside this, we believe that Mr. Archibald Rosser himself (and we have no objection to

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advertise him), is about to offer to patentees professionally the benefits of his extensive knowledge and experience in the mechanical arts, in settling their specifications and other scientific matters at his office, No. 15, New Boswell-court, St. Clement's-lane, Clare-market.

In conclusion, Mr. Rosser says, "Mr. Newton has hinted to me some intention to take the colour of your cover (the yellow wrapper)—to use the words *Repository* instead of *Repertory* in his title; or in some other way that his ingenuity can devise to imitate your work." In order that Mr. Hodson may be perfectly free from all apprehension on that subject, we beg most respectfully to inform Mr. Rosser, that if he has conceived this notion from any private conversation with us, he is decidedly mistaken, we do not intend in any way to imitate Mr. Hodson's New Repertory, and shall take care not to pirate his YELLOW COVER; but, as we have (now by Mr. Hodson's admission) unquestionably bought from Mr. Wyatt (not, as Mr Rosser asserts, "some old back stock," the whole of which, being imperfect, was sold to a Mr. Chidley for *waste paper*, but) the ENTIRE COPYRIGHT, with the original copper-plates of the Repertory of Arts and Manufactures, first series, sixteen volumes; the Repertory of Arts, Manufactures, and Agriculture, second series, forty-six volumes, and the Repertory of Patent Inventions, third series, nine volumes, we shall most decidedly continue to use the title of REPERTORY as connected with our Journal, without the least reserve or disguise, taking especial care, in the best way we can, to make such an evident distinction on the wrapper, as to prevent the public from mistaking Mr. Hodson's New REPERTORY OF PATENT INVENTIONS from our original "LONDON JOURNAL AND REPERTORY OF ARTS, SCIENCES, AND MANUFACTURES," which will still continue to report the specification of ALL PATENT INVENTIONS, as in the former series of the work.

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THE

London

JOURNAL OF ARTS AND SCIENCES

AND

REPERTORY

OF

PATENT INVENTIONS.

CONJOINED SERIES.

No. XXXVI.

Recent Patents.

To WILLIAM LONGFIELD, *of Otley, in the county of York, whitesmith, for his invention of an improved lock or fastening for doors, and other situations where security is required.*—[Sealed September 6, 1834.]

THIS invention of an improved lock or fastening for doors, and other situations where security is required, consists in the construction and arrangement of a novel combination of mechanism, in which a lever bolt is adapted to act upon the ordinary sliding or shooting bolt of a lock, for the purpose of confining the shooting bolt when its end has been projected or shot out, as in the act of locking. By the employment of this lever bolt, the sliding or shooting bolt, when projected,

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cannot be moved back without first applying a key to withdraw the end of the lever bolt from its holding position.

Figs. 1, and 2, Plate I, represent the internal construction of a lock on this improved plan, the face plate being removed to show the interior and the moveable parts in different positions in the two figures: *a, a,* is the sliding or shooting bolt; *b, b,* the lever bolt, the end of which, it will be seen, is intended to pass into a notch *c,* in the under part of the sliding bolt, as shown in fig. 1, for the purpose of preventing the sliding bolt from being shifted from its locked position.

Fig. 3, is a skeleton of the lock, showing the working parts more perfectly. On the upper edge of the bolt *a,* a rack is formed, into which the teeth of a pinion *e,* take, for the purpose of sliding the bolt: below is a cam roller *i,* which acts upon the lever bolt *b,* for the purpose of depressing it, the lever being mounted on a fulcrum at *z,* and thrown up by a spring *y.* The key-hole at which the key is introduced for sliding the bolt *a,* is formed in a cylindrical tube *d,* which is proposed to be made long enough to extend through the stile of the door, and to come flush with the outside. Behind this tube is the pinion *e,* having a recess into which the web of the key passes for the purpose of turning it. As the teeth of this pinion take into the rack on the upper edge of the sliding bolt *a,* it will be perceived that when turned by the key, the pinion will move the bolt to or fro. In the tube *h,* which is of the same dimensions as the tube *d,* the hole for the key is formed, by which the lever bolt *b,* is operated upon, and behind the tube is the cam roller *i,* which the web of the key takes into. Fig. 4, is a transverse section of the lock, showing the position of these key-hole tubes, and

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of the pinion *e*; the sliding bolt *a*, the cam roller *i*, and the lever bolt *b*, confined between two plates, *f*, and *g*. Fig. 5, is a similar section, taken through the key-hole tubes *d*, and *h*; the pinion *e*, the sliding bolt *a*, the cam roller *i*, the lever bolt *b*, and the parallel plates *f*, and *g*, Fig. 6, shows the inner side of the parallel plate *f*; fig. 7, the inner side of the parallel plate *g*; and fig. 8, is an edge view of the last mentioned plate, with the guide pins *k*, and *l*, which project through the key-hole tubes fixed therein. For the better illustration of these parts, the pinion *e*, is shown detached at fig. 9, and edgewise at fig. 10. The cam roller *i*, is also shown detached at fig. 11, and edgewise at fig. 12. The pinion, in the position in which it stands at fig. 9, is to be dropped into its socket in the parallel plate *f*, fig. 6; and the cam roller, fig. 11, likewise into its socket in the parallel plate, fig. 6; after which, the other parallel plate *g*, fig. 7, or 8, is to be attached to these, and secured by screws *m*, *m*, as shown in figs. 4, and 5; when the shoulders of the pinion *e*, and of the cam roller *i*, will be confined within sockets in the parallel plates, but allowed to turn freely. The key, fig. 13, is made to suit the lock here represented, the sides of the web of the key fitting the key-holes or apertures in the pinion *e*, and cam roller *i*, and the steps of the web being made to correspond to certain steps or wards formed at *n*, in the back part of the tube *h*.

The Patentee proceeds to state that he does not confine himself to any particular form of steps, or inequalities on the web of the key, but varies them at pleasure, observing that the key-holes of the tubes *d*, and *h*, and also of the pinion *e*, and cam roller *i*; and the form of the wards *n*, in the tube *h*, must be made to correspond with the key; and also that the internal

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form of the tubes may be arranged so that the key may be required to make one or more turns, or any portion of a turn in the tubes before it passes home to the place where its web acts upon the pinion or cam roller.

By introducing the key through the passage of the tube *d*, and turning the pinion *e*, the bolt *a*, will be projected, as shown at fig. 1, when the lever bolt *b*, will, by the force of the spring *y*, be raised, and its end introduced into the notch *c*, of the sliding bolt, thus confining the bolt in its locked position; and the key in the tube *d*, will be no longer able to move the sliding bolt. In order, therefore, to unlock, that is, withdraw the bolt, the key must be first introduced through the passage of the tube *h*, and the cam roller be turned round into the position shown at *i*, fig. 3, which will cause the cam of that roller to act against the lever bolt, and, by depressing it, to withdraw the end of the lever bolt from the notch, the cam roller *i*, being confined in its action by a pin or stud *o*, projecting from the plate *g*, fig. 6, which pin acts between two small projections on the periphery of the cam rollers. The key may then be taken out of the tube *h*, and introduced into the tube *d*, and the pinion *e*, be turned round so as to slide back the bolt into the position shown in fig. 2: *p*, is a friction spring, acting upon side of the slide bolt to steady its movement.

The Patentee further remarks, that it will be evident that the position of the lever bolt *b*, and rack and pinion *e*, may be reversed, or both placed so as to act upon one edge of the sliding bolt: he therefore does not intend to confine himself to the precise positions shown in the figures.

Lastly, the Patentee desires it to be understood, that he claims the invention of the combination of the parts

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constituting a lock or fastening for doors, or other situations where security is required, as above described, and particularly the adaptation of a lever bolt to confine the sliding bolt, however that lever bolt may be applied to such purpose.—[*Inrolled in the Rolls Chapel Office, March,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To WILLIAM PALMER, *of George-place, Old-street-road, in the county of Middlesex, candle-maker, for certain improvements in making candles, and in candlesticks or apparatus for holding candles.*—[Sealed 29th September, 1832.]

THE invention described under the above patent consists, first, in a method of more quickly cooling the melted tallow poured into the moulds for forming candles, by the application of cold water, surrounding the frames or moulds; and secondly, in the construction of an improved candlestick or holder, by which the flame of the candle is kept at one height while burning, and the candle is prevented from guttering.

Plate I., fig. 14, which constitutes the first part of this invention, represents a plan or horizontal view of a wooden cistern made perfectly water tight: *a, a, a,* are three brass, or other suitable metal, plates, each being perforated with thirty-six holes to receive the upper ends of the same number of candle moulds; *b, b,* are two divisions that separate the cistern into three chambers, within which the candle moulds are placed; the upper ends of these are shown at *c, c, c*; *d, d, d,* are three wooden plugs that fit tightly into holes made to receive them in the bottom of the cistern;

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these retain the water, or other refrigerating liquid, as long as may be found necessary, and then being withdrawn, the liquid will immediately escape, and the refrigeration will of course cease, except what may be finally effected by the temperature of the atmosphere; *e*, *e*, are two pivots, on which the cistern turns when it is necessary to discharge the candles from the moulds; *f*, *f*, are two side bearings of a wooden frame that receive and support the pivots *e*, *e*, and likewise the whole weight of the cistern.

Fig. 15, represents a vertical section of the apparatus taken through the dotted line *g*, *g*, in fig. 14; *h*, *h*, is a brass plate perforated with similar holes to those seen at *a*, *a*, to receive the lower ends of the candle moulds. These metal plates, therefore, form the top and bottom of each division or chamber in the cistern *i*, shows the passage for the water, or other refrigerating fluid, when it is poured in at *k*; and *l*, is an opening made through the upper part of each chamber to let the air escape.

When this cistern and moulds are to be used, a strong pin *m*, fig. 14, is passed through a hole in the frame, and into a corresponding one made in the side of the cistern, by which means the cistern will be prevented from turning on its pivot *e*, *e*, in fig. 14; and the moulds will be retained in a perpendicular position to receive the tallow after the cottons are properly placed and adjusted in them. As soon as the moulds are charged, the refrigerating liquid must be poured into the cistern as quickly as possible; and when it has remained there until the exterior surfaces of the candles in contact with the moulds have become hardened, the three plugs *d*, *d*, *d*, must be withdrawn from their holes, and the water or other fluid will flow out, and

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then the candles may in a short time afterwards be drawn from the moulds in the usual manner.

Stearine, when melted, and in a state to be poured into the moulds, will vary in the temperature from one hundred and twenty to one hundred and thirty degrees of the thermometer; and the refrigerating fluid used in such cases must be at a temperature of sixty-two degrees, by which means the advantages before named will be obtained, and the necessity of regulating the temperature of the room will be avoided. When softer materials than stearine are used, which require to be poured into the moulds at a lower temperature than stearine, then a proportionally lower temperature must be used in the refrigerating fluid; and for this purpose the water from a well may be used with advantage, the mean temperature in the summer being about forty-eight degrees; and where harder or intermediate substances are used, the judgment of the manufacturer will readily accommodate the temperature so as to produce the desired effect.

Fig. 16, Plate I., represents a vertical section of a spring candlestick, with the improvements applied thereto, constituting the second head of this invention: *a*, represents a section of the tube, which forms the stem; *b*, is a spring placed within the tube or stem in the manner of the common coach lamp; *c*, shows the guiding rod, which is a rod of iron passing through the interior of the tube *a*, having a circular piece of metal attached at either end, to keep it in a fixed position, and parallel with the groove *g*, *g*, hereafter described; *e*, is a projecting arm or slide, kept in its position on the rod *c*, by the brass tube attached thereto; to the arm also is attached a socket or candle-holder at *f*, which slides up and down the

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rod *c*, passing within the groove *g*, *g*; *d*, is a brass tube, attached to the projecting arm *e*, above described, and sliding on the rod *c*; *f*, is a moveable socket or candle-holder, in which the candle is to be placed; at *g*, *g*, is formed a long groove or slit, extending nearly the whole length of the tube within which the arm *e*, is made to slide parallel to the direction of the rod *c*; *h*, is the nozzle of the candlestick, into which the top of the candle enters, the wick passing through it, and is placed perpendicular to the socket or candle-holder *f*, and is connected with the top tube, as shown in the figure; *i*, is a bracket, for the purpose of supporting a shade.

Fig. 17, represents a section of the candlestick, showing the position of the slide and spring when a whole candle is to be placed in it for use; the dotted lines between the nozzle *h*, and holder *f*, show the space to be occupied by the candle. Now it will appear that the upper part of the spring *b*, guided by the rod *c*, being made to bear against the under part of the arm *e*, the arm will be moved in a direction towards the nozzle *h*, carrying with it the candle; the tallow near the wick, when lighted, becomes melted; it is then gradually consumed, and the spring continually forcing the candle upwards will furnish a constant supply of fresh tallow to the nozzle. By such described improvements, a candlestick or apparatus for holding candles is produced, which will effectually prevent the candles used therein from guttering, and protect the springs, or other moveable parts thereof, from derangement in their action by coming in contact with the material of the candles; and thus the constant necessity of taking out the spring to be cleaned will be avoided.

The Patentee concludes by saying, that his invention

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consists, firstly, in the application of a cistern, having proper apertures for receiving and discharging the water, or any other refrigerating fluid, within which is enclosed any sufficient number of candle moulds (according to the size) in such a way, that the ends of the pipes shall appear at the outside of the top and bottom of the cistern, and not communicating with the interior; and so that the moulds being filled with stearine, tallow, or any other suitable material, may, being acted upon by the water or other cooling fluid, be so cooled as to produce a greater facility than ordinary in discharging the candles therefrom, and also in preserving them sound and straight.

Secondly, a projecting slide, as connected with a spring or springs, applied to a spring candlestick or apparatus for holding candles.

Thirdly, a rod of metal or other material of a cylindrical, angular, or any other form, and whether solid or hollow, upon or by which any slide placed in an external position from such rod is guided, to be used with a spring candlestick, or apparatus, for holding candles, for the purpose of directing the candles in a line parallel to itself.—[*Inrolled in the Inrolment Office, March,* 1833.]

To JOSEPH GIBBS, *of the Kent-road, in the county of Surrey, engineer, for his invention of certain improvements in the processes of dressing or preparing hemp, flax, New Zealand flax, and other vegetable fibrous substances, to render them fit for spinning, paper-making, and other purposes.*—[Sealed Jan. 19, 1833.]

THE machinery described under this invention is shown in Plate I. Plate I., fig. 18, represents a front view or

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elevation; fig. 19, an end view; and fig. 20, a plan view of part of a machine for dressing, preparing, or rubbing hemp, flax, New Zealand flax, or other vegetable fibrous materials or substances; in all which figures the same letters of reference indicate the similar parts: *a*, is the framework of the machine, which is firmly affixed to the floor of the workshop; *b*, is one of a series of cast-iron plates, which are fixed upon the top of the framework of the machine, a separate top view of which is shown in fig. 21; *c*, *c*, in the latter figure, represent eight sets of grooves, furrows, or channels, made in the cast-iron plate, and *d*, *d*, are four oblong holes or apertures made through the plate; *e*, *e*, *e*, *e*, are four circular holes or apertures, with shoulders in them, for the heads of the screws to lodge upon, by means of which the plate is affixed upon the top of the framework *a*, the heads of the screws being sunk below the surface of the plate. Other top and moveable cast-iron plates *f*, (the under surfaces of which are grooved, furrowed, or channelled, so as to correspond exactly with those in the bottom plate *b*, and which are also furnished with four corresponding oblong holes or apertures *d*, *d*, *d*, *d*, as shown in fig. 20,) are also provided, one for each of the fixed plates. These top plates *f*, are guided, and caused to move backwards and forwards in the following manner:—*g*, *g*, represents part of a wooden bar which extends the whole length of the machine, and is lined with iron plates underneath, and partly on its sides, as shown in fig. 22, which is an end section of it, and in fig. 23, which is a side view of part of it. This wooden bar *g*, is supported at each end upon a friction roller, one of which, *h*, is shown in figs. 18, and 19, and is lodged within two cheeks or side plates *i*, *i*, which are formed upon the upper surface of the moveable

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plate *f*. The bar *g*, has also iron studs, *j, j*, projecting from its sides, as shown in figs. 20, and 22, and one of them in figs. 18, and 23, which are received into upright gaps, made in the middle of each cheek; and one of which is shown at *k*, in fig. 18, and both of them at *k, k*, in fig. 20. This bar *g*, is continually moved backwards and forwards, by means of a crank or other well-known contrivance, and which is actuated by the steam-engine or other first mover of the machinery, and thus carries the several moveable plates along with it, as above mentioned. The hemp, flax, or other fibrous materials to be operated upon by the action of the rubbing machine, after having been previously roughly hackled, their fibres laid straight, and slightly twisted into slivers, are passed over two loose guiding cylinders or rollers *l, m*, mounted or affixed on each side of the machine to the wooden bar *g*, and are then passed down through the oblong apertures *d, d, d*, made in the moveable and fixed plates *f*, and *b*, when the apertures are placed opposite to each other, and are laid between the two pairs of pulling, or drawing, channelled, or grooved rollers, *n, o, n, o*, on each side of the machine; and as shown in figs. 18, 19, and 20; and as these pulling rollers are slowly turned by the action of the machinery, the flax, hemp, or other fibrous material are exposed to the rubbing action of the grooved furrows or channels, or of the ribs formed between them upon the cast-iron plates *b*, and *f*, for a longer or shorter period, and according to the nature of the said fibrous materials, and as experiments shall determine. The outer channelled rollers *o, o*, &c., are pressed into contact with the inner one, *n, n*, &c., by the bent levers *p, p*, &c., and the weights *q, q*, &c., hung upon their outward ends, the weights being capable of being

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shifted nearer to, or farther from, the fulcrum of the levers, as the pressure may require: *r, r,* &c., are wooden boxes, to contain and deliver the fibrous materials to the machine, and to receive them after being exposed to its action.

The hemp, flax and other vegetable fibrous substance, are thus continually rubbed, dressed, or prepared between the furrowed or channelled cast-iron plates, by the backward and forward alternate movements of the upper plates, they being carried to and fro by means of the oblong apertures in the upper plates, through which they were passed, as before mentioned; and if the weight of the said upper plates should not be sufficient to open the fibres properly, they may be loaded with additional weights, placed in partitions *s, s,* provided for that purpose in the middle of each plate, as shown in fig. 20; and as the fibrous substances become sufficiently opened, they are gradually drawn forwards from between the furrowed or channelled plates through the oblong apertures in the lower or fixed plates, by the action of the grooved rollers. The fibrous materials, when so treated, may then be finished in any of the usual modes, and prepared for spinning, but with considerably less waste of fibres than has generally hitherto been effected; and the shortest of the fibres may be used for making paper, or other purposes, with considerable advantage. Although it has been stated that the furrowed or channelled plates are placed horizontally, yet they may also be used in a vertical or upright, or any other convenient position, and kept in contact with each other by means of springs or otherwise. It is likewise sometimes found advisable, when working harsh materials, to soften them, by causing steam to pass between the fibres; and should they not be found

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to be sufficiently separated, opened, or divided, by passing them through the machine once, the operation may be repeated as often as may be found necessary.—[*Inrolled in the Inrolment Office, July,* 1833.]

To JOHN JAMES CLARK, *of Market Rasen, in the county of Lincoln, gentleman,* JOHN NASH, *of the same place, tile and brick-manufacturer, and* JOHN LONGBOTTOM, *of Leeds, in the county of York, machine-maker, for certain improvements in the machinery and process used in the manufacture of bricks, tiles, bread, biscuits, and various other articles of commerce, made from plastic materials.*—[Sealed 13th April, 1832.]

THE Patentees describe their invention to consist, first, in improved machinery or implements to be used in the making of pantiles, flat tiles, drain tiles, sole tiles, flooring tiles, bricks, quarries, water pipes, and other tubes, coverings for buildings, and various other articles, formed of aluminous earth, or other suitable plastic matter; which machinery or implements are applicable to the formation of loaves and biscuits, for the subsequent operations of bread and biscuit-bakers. Second, in covering or lining the moulds used in the manufacture of the aforesaid articles, with fibrous elastic substances or fabrics (such as cloth, for instance,) that are capable of being made alternately to absolve and give out air and moisture. Third, in the mode of applying water or other suitable liquid to the moulds, linings, pistons, and other accessory working parts, to prevent the adhesion of the plastic matter operated upon. Fourth, in the application of heaters to the moulds or

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machine during the operation of moulding, to drive off a portion of the moisture from the newly-formed articles, and thus expedite the solidifying and drying of them.

Having thus stated the general nature of this invention, the Patentees proceed to describe in what manner the same is to be performed. Figs. 1, 2, and 3, Plate II., are different elevations or side views of a machine for the aforesaid purposes, some portions of which are represented in section for the better representation of the mechanical arrangements; the same letters of reference being marked on corresponding parts in all these figures; *a, a*, is a vertical shaft, which is made to revolve in the cylinder or pug mill *b*, by the application of adequate force from any first mover, which may be effected through the medium of gear to the bevil wheel *c*, or by the employment of any other suitable mechanical agency. To this shaft *a*, are fixed broad steel or iron knives, or blades *d, d, d*, each of which has fastened to it three smaller blades, projecting from its uppermost side; circular holes are made in the vertical shaft, through which the rounded extremities of the larger blades are passed, and secured on the opposite side by screwed nuts *e, e, e*, in such manner as to allow of the position of the blades being easily adjusted or inclined to the angle best suited to prepare, regulate, and adapt the force and motion of the clay or other material through the cylinder or pug mill to the quantity required in a given time. The clay or other material may be conveyed into the cylinder or pug mill by means of waggons propelled on a railway, or other means. When the mill is charged, the motion of the knives or blades produced by the revolutions of the vertical shaft gradually tempers and forces the plastic materials into a hopper *f*, fixed to the lower extremity of the pug mill. This hopper

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is divided into two equal chambers by a vertical blade or knife h, which separates the clay or other material, by which means equal quantities are supplied to the moulds in a compact and solid state. The moulds employed are separate; that is, they may be detached at pleasure from the cavities in which they are lodged. Recesses for the reception of these moulds are formed around the peripheries of two pair of wheels, with broad rims i, i; one pair of which is plain, seen best in fig. 2; the other pair is toothed; (seen best at k, k, figs. 1, and 3,) and being in gear with each other, are made to revolve in opposite directions, by motion being communicated to one of them; as hereafter described. Between these pair of wheels there are fixed, at equal and proper distances, two distinct series of oblong wedge-formed boxes, , ll, called "hollow sectors," and when arranged, the figure of these sectors causes a similar number of rectangular spaces to be left alternately between them, as denoted on one wheel by the series of the letters A, to L, and in the other wheel by the figures 1, to 12; into these spaces the separate or detached moulds are placed during the operation of the machine; and into each of the hollow sectors is placed a red hot iron, or other heater: the effect of which heating of the machine is to expel the superfluous moisture from the tiles, bricks, &c., and thus enables the manufacture to be conducted in the winter as well as in the summer season. The heating of the heaters is conveniently conducted, and without any sensible expense, at the kiln fires, whilst the latter are in operation; and when they are not, at a trifling cost when compared to the advantages of the early drying and solidifying of the newly-formed articles.

The form and dimensions of the separate or detached

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moulds are varied according to the nature of the articles to be produced therefrom; and the moulds themselves, after being filled with the plastic material, are pushed out from their recesses by means of pistons at *m*, *m*, easily fitting the recesses, and sliding upon parallel radial rods fixed to the rims of each wheel. To the bottom of each piston, and connected with the parallel rods, is attached a flat shaft *o*, (see fig. 1), each end of which carries a small anti-friction roller *p*, (seen best as fig. 2), which, by the motion given to the machinery on approaching the place of delivery, comes in contact with a larger roller *q*, (fig. 2,) placed eccentrically from the wheels of the mould receivers, and raises the moulds *r*, *r*, containing the tile or brick, &c., within them, which are then to be taken up and removed by hand, and emptied in a similar manner to that usually employed when bricks are moulded by hand. During the latter process the emptied mould receiver will have passed over the centre of the tappet roller *q*, and the piston has descended, or is descending, when the attendant replaces the emptied mould in its former situation, to be filled again from the hopper as it passes under it.

The rims of the wheels for the mould receivers are made polygonal or flat-sided at the edges between the hollow sectors and the axes *s*, *s*. These wheels revolve in plummer boxes mounted on pedestals or blocks, which slide horizontally between guiding grooves made in a strong metallic framing or rails underneath. To one end of each pedestal is attached a helical spring *t*, *t*; the other end of each spring abutting against a regulating screw, which passes through the extremity of the fixed rail: the result of which is, that the pedestals, and the wheels which they carry, are kept constantly

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in contact, notwithstanding the unequal polygonal figure of their rims. In the middle of and beneath the horizontal rail is fixed a knife *u*, supported in its place by the elastic pressure of a spiral spring, which separates the whole, or a portion of the superfluous materials from each mould, as the latter passes over the edge of the former.

As some redundancy of material may still be left after the second operation of the knife *u*, the exposed surface of the matter in the moulds undergoes a similar treatment from two other elastic knives or scrapers, *v*, *v*, fixed to the foundation plate *w*, of the machine.

For the purpose of moistening the moulds and their adjuncts, to prevent the sticking of the plastic matter thereto, a trough or cistern *x*, *x*, containing water, or other suitable fluid, is placed underneath each of the pair of wheels, the peripheries of which come in contact with the cylinder *y*, which is covered with strong coarse cloth, or other absorbent substance, which, as it revolves, takes up the fluid from underneath, and delivers it to the moulds, &c., as before mentioned. The axles of these cylinders are mounted on elastic bearings, and derive their motion from pinions on their axes actuated by the toothed wheels of the mould receivers. In the centre of the foundation plate there is a cavity or pit for the reception of the superfluous clay, or other materials, from whence it is removed at pleasure. In the cylinder or pug mill is a door 13, for the convenience of cleaning it out. The whole of the upper part of the machine is supported by three columns *g*, *g*, *g*, fixed to the foundation plate. The mould receivers are driven by means of a pulley or strap wheel 14, (fig. 3,) fixed to one of the columns; to which pulley wheel is attached a pinion 15, that drives a larger wheel 16, running loosely on the shaft

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of one of the mould receivers: this last propels another larger wheel 17, fixed on the shaft of the other mould receiver; and by the toothed wheels *k, k*, on both the mould receivers gearing into each other, they are driven round together, but in opposite directions.

Fig. 4, exhibits another arrangement, which the Patentees have adopted for making flat tiles, flooring tiles, or coverings for buildings, made of the breadth and thickness required.

To the bottom of the cylinder or pug mill is fixed a funnel-shaped hopper 18, the materials in which, after being forced through a mouth 19, formed to the required shape, are received upon boards propelled on an endless band or platform, and when cut to the proper length are removed to sheds for drying.

In order to equalise the surface of the material after it has come out from the hopper, a roller 20, turning upon a curved arm which is fixed to a hinge joint, gives the material any pressure that may be required, it being weighted accordingly.

The dotted lines 21, 21, in the same figure, exhibit another funnel-shaped hopper, for the purpose of making tubing or piping by means of a centre core 22; between which and the cylindrical continuation of the hopper the material is forced by the action of the pug mill, and produces a tube, which, after having made a certain length, is cut off, the tubing being turned round to render the inside smooth previously to its being removed.

Figs. 5, 6, 7, 8, and 9, show some of the various shapes which the machine is capable of making. Fig. 5, represents the manner of taking the arched drain tiles off the horse 23, on which they are formed, the square hole being for the insertion of a handle at each

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end to facilitate the removal. Fig. 9, shows another kind of horse 24, which may be made use of. Fig. 10, shows a longitudinal section; and fig. 11, an end elevation of a mould for making bricks of the same kind, as is partly represented at *r*, *r*, in fig. 2. There are two moveable blocks 25, 25, (see fig. 1,) placed in the hopper, which are to be taken out when the tiles, &c., are required to be of a greater length than a brick. A railway of a convenient length may be prepared to work on a centre for the removal of tiles, &c., from the machine. Two dozen or more tiles, &c., may be placed on a waggon on a platform, the railroad being balanced by a weight; so that a person pulling the weight will raise one end of the rail-road, and convert it into an inclined plane, thereby causing the waggon to proceed to the place where the tiles, &c., are to be taken off and laid out for drying. The other end is then raised by similar means; and the empty waggon is again returned to receive the next load of tiles, &c., which are placed thereon by the person attending the machine. In manufacturing on the small scale, the tiles, &c., may be advantageously removed by boys on pallets placed on wheel-barrows. The above described process will also answer for the making of flour, paste, or dough into various shapes; the form of the moulds being adapted, of course, to the figure required.

In case of negligence on the part of the boys or other attendants to the machine in not removing the tiles, &c., after the moulds containing the several articles have passed the centre of the eccentrically placed roller *q*, they fall into their former position, and pass round to the place of delivery as before, without any damage whatever being done to the machine. Should a stone or other hard substance, by accident or

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otherwise, fall into the cylinder, by throwing off the strap communicating motion to the mould receivers, they are put out of action, while the mill continues to work without the liability to injure any part of the machinery.

In case the clay or any part of the materials become too stiff, which may occasionally happen, a cistern for the reception of water or other liquids is placed on the top of the cylinder or pug mill, provided with a cock having a rose at its end, to convey the liquids to that part where it is wanted, so as to equalise the tempering of the clay or other materials.

Having now described certain means by which the improvements may be carried into effect, the Patentees state that they do not claim the whole of the parts described or exhibited, as some of them distinctly considered are not their invention; they therefore proceed to describe those parts which they do claim: first, the application of separate or detached moulds (of the particular construction described) in cavities or receptacles, for the before-mentioned purposes, to any system of mechanism (that is to say), whether those moulds be arranged in a circular, a polygonal, or curved—a rectilineal or other surface, or surfaces, line, or lines, as the same, or nearly the same, advantages will result therefrom. The circular or polygonal form exhibited in the figures, is therefore by no means necessary to the invention; it shows only one convenient mode of applying it. Secondly, the Patentees claim the application of heaters in contact or contiguous to the mould receivers. Thirdly, the application of springs to keep the mould receivers in contact with each other; and fourthly, claim the application of cloth, or other fibrous, elastic, or absorbent substances,

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and the application of liquids to those substances in the preparation of the articles before-named from plastic materials, by machinery or otherwise.—[*Inrolled in the Petty Bag Office, October,* 1832.]

To John Henry Cassell, *of Mill-wall, Poplar, in the county of Middlesex, merchant, for his invention of a cement or combination of materials applicable to purposes for which cement, stone, brick, or other similar substances, may or can be used.*—[Sealed April 19, 1834.]

This invention consists in cementing or combining the materials for making roads, and for constructing docks, water-courses, foundations, and other similar works, by the aid of coal or other mineral tar, wood tar, and resinous matters, or the products of tar, in the manner hereafter described; and thus producing a mass, which may be formed or moulded into any figure, which, when cold, will be exceedingly hard, and be serviceable for the purposes of cement, stone, or brick, in constructing any such like works or buildings, as before mentioned. But in order that this invention may be perfectly understood and carried into effect, it may be necessary to describe the methods used by the Patentee for combining such materials together, and applying them to the aforesaid purposes. A quantity of tar, such as is produced by the distillation of coal, shale, or wood, is first taken, and by further distillation the aqueous parts are separated therefrom, and thus the tar or resinous substance is reduced to the consistency of treacle; this is called the first product, the tar or resinous substance

being in a thick and adhesive condition when cold. In order to produce the second product, the distillation is carried on still further, and by this means the essential oil is obtained; and for the third product, the process of distillation is carried on, till the substance becomes so adhesive, that a small portion being removed from the still may be drawn out into threads, and, when cold, becomes brittle; and for the fourth product, the distillation is carried on still further, till the substance becomes extremely hard, and which will not soften by heat, either of the sun, or any other artificial heat. The apparatus or still which is used for this purpose, is similar to that which is called a pitch still, which is well known, and forms no part of this invention, nor does the process of distillation for separating the tar into three products; that is to say, first, tar deprived of the aqueous parts, and reduced to a thick and adhesive condition when cold. Secondly, the essential oil. Thirdly, the adhesive tar, or product thereof, which, when cold, is hard; and fourthly, the substance not acted on by the heat of the sun. It may be desirable here to remark, that coal tar is preferred, in consequence of cheapness.

The Patentee then proceeds to describe the combining of these products with other materials, in forming a cement or combination in the making of roads, docks, water-courses, and such like works. We will first describe the method pursued in applying this invention to the making of roads, or in repairing them. Having laid out the road, and made the necessary drains for preventing the lodgment of water below the road, the surface is prepared by beating or rolling, in order to compress the earth, particularly when the surface is composed of loose earth, and, by raking, bring the sur-

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face to the required figure, that is, with such slopes as may have been determined upon, and make the same as even as possible. The surface is then saturated with the essential oil (the second product) in thin layers, allowing time for it to subside. The oil put on in this manner will quickly penetrate the ground: the second operation is then commenced, which consists of spreading over the surface of the earth so prepared a thin coating of the first product, perhaps one-fourth of an inch thick, then let the same be ignited, and permit it to burn a short time. Dry sand, or fine dry earth, or slag, or cinder, or a combination of these, should then be sifted on the tar and oil, to the depth of about half an inch, which will instantly put out the flame. The ground should then be rolled, in order to cement the tar and sand together; and, in order to facilitate the operation, it is found desirable to have a frame of iron, or other material, about three feet square, which is successively placed over the surface of the ground, and thus complete portions of the surface at each operation. By this means, it will be evident that a thin cemented layer or surface will be produced on the road. In some instances, one, two, or more layers of this description may be made on the road, depending on the extent of traffic to which it is to be subjected; but it will be desirable to remark, that the essential oil is only used previous to the first layer. Having thus prepared the under surface of the road, the Patentee proceeds to describe in what manner the same is finished; and observes, that the finishing materially depends on the description of materials, which may be readily obtained at the place where the road or other work is being constructed, such as broken granite, flint, slag, gravel, or any other hard material suitable for the surface of a road. It should be observed, that

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the same should be broken somewhat small, say not larger than three inches, and one-third of the third product should be taken to two-thirds of sand, and boil and mix them together; then pour such mixture over the broken materials to the desired depth, which, running into the space between the stones, forms a very hard and solid mass when it cools. When the said fourth product is in a melted state, any of the materials, such as sand, stone, &c., may be mixed in an open vessel, in the proportion of one-third of the fourth product to three of the stone, sand, &c., by weight, and mix them well together; and when so mixed, the composition is spread over the surface of the road from one to four inches deep, or more if it is thought necessary, the road being prepared as before described: this is then rolled, so that as even a surface as possible will be produced; by which means a hard surface will be formed, which will wear exceedingly well, and produce a cheap and lasting road. Or where it is desired that the upper surface should be formed of larger stones, or other material, such as broken granite, flint, slag, or other substances, of a size such as is generally used in making what are called Macadamized roads, frames or moulds may be used, from twelve to forty-eight inches square, open at top and bottom, like a brick mould, pack in them a number of such broken pieces of material, and then run in a quantity of the fourth product in a melted state, and thus fill up the interstices between the stones or other materials, making the upper surface as even as possible. These materials, when left in the moulds till they are cold, will be strongly cemented together, and be ready to form the upper surface of a road; they should be put on in the following manner: having prepared the road, as above described, by the essential oil, with the first product, and

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the sand or fine earth, a coat of the third product of the tar should be spread over to about the thickness of one inch; then, while the third product is warm, cover the road with the moulded materials, placing that part which was uppermost in the act of moulding on the surface of the road prepared as above, and by rolling or pressing, caused the moulded parts to adhere firmly together; by this means, rather a rough surface will be produced, suitable to the tread of a horse. The first preparation is also used to cover good Macadamised or other roads, which firmly cements every stone into its place, prevents the wheels from ploughing up the roads, the water from softening the sub-strata, and preventing mud and dust from rising. The third product is also used, when in a melted state, to pour between the joints of street pavement, in the manner that grouting is now performed: this will cement every stone together, and so prevent water from getting beneath the stones to the sub-soil or rising therefrom. If the sub-strata is of a soft substance, or the street is required to be very durable, the ground is first prepared, as described in the first process; the paving stones are then saturated with essential oil, and the third product is then run between the joints of the stones or bricks that are required for foundations. The resin of wood is used for making stone and cast figures, that are required to be of a yellow colour; sand of the required colour is added, as in the fourth process. In some instances, instead of moulding such larger pieces of flint stone, or other material, sand, or fine earth, is mixed with the fourth product when in a hot and melted state, and the composition is moulded, as above described: such materials being very suitable for foot paths, water-cisterns, pipes, and a variety of other useful purposes.

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Having thus described the nature of the invention, as applied to roads, the Patentee proceeds to describe its application to canals, docks, water-courses, and such like works. The earth being excavated, and the slopes of the banks made to the intended figure, the next process is to beat the surface of the earth; and in order to render the same as compact as possible, it is saturated with the essential oil, as before described; then a thin layer of the first product of the tar is run over and ignited; after that, sand, or any other dry earth or material, is sifted over, as above described. Three layers of these cemented materials will be sufficient, when applied to the usual slopes for canals and water-courses, and will offer a compact and close surface to the water; which will protect the banks from the prejudicial washing to which they are otherwise subject, and consequently be of great utility when quick travelling is required, or when the canal boats are propelled by machinery. In forming the embankments of docks or quays requiring steep or perpendicular walls, a much stronger facing is required, depending on the depth of the water they are to support, and also the description of ground behind. The Patentee proceeds to state that a framing of wood is usually constructed to the desired thickness; and having previously made a good base or foundation of a combination of the fourth product of the tar, with broken stones, or other rough hard materials, and sand or earth, he continues melting and mixing quantities of the fourth product of tar with broken stones and sand, in the proportion of about one of the fourth product to three of the stones and sand, or other material, and successively throws them into the frame, and levels and beats such concrete mixture, till the frame is quite full to the surface of the

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intended finish of the wall, which is usually made to lay on the surface of the earth. It would be advisable to remark, that between each quantity of the material thus put into the frame, it is found desirable to spread over a thin coat of the first product of the tar, and ignite the same, in order that the surface of the last quantity should be in a melted state, to receive the next quantity of the materials. It will be evident, from the above description, that piles, and also land-ties, may be built in the walls, in order to give additional strength to them; and that where frames or moulds are used, they are washed over with a covering of white-wash or of clay, by which means the composition does not adhere to them.

The Patentee concludes by saying, that having thus described the nature of his invention, and the manner in which the same is performed, he would have it understood that he does not claim any of the materials separately; and it will be evident that the means of carrying the same into effect, may be varied to suit the particular object to which the invention is to be applied: but he would have it understood, that what he claims as his invention is, the cementing or combining the materials for making and mending roads, and for constructing docks, water-courses, water-tanks, pipes, and such like works, by the aid of tar and resinous substances, or the products thereof, as above described. —[*Inrolled October*, 1834.]

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To James Gardner, *of Banbury, in the county of Oxford, ironmonger, for his invention of certain improvements on machines, for cutting Swedish and other turnips, mangel-wurzel, and other roots, used as food for sheep, horned cattle, and other animals.*—[Sealed September 25, 1834.]

This invention of certain improvements on machines for cutting turnips and other roots, used as food for sheep and other animals, consists in the construction of a peculiar sort of rotary cutter, and its adaptation to a machine for cutting turnips and other roots for feeding cattle.

In the accompanying figures, fig. 12, Plate II., represents a machine, in which the peculiar construction of the rotary cutter is shown in operation (the side of the box of the machine, and also of the feeding hopper, being removed, for the purpose of exhibiting the parts within.) Fig. 13, is a top or horizontal view of the machine, by which the construction of the rotary cutter will be more clearly perceived. This rotary cutter is formed as a drum, mounted upon an axle, parts of its periphery, as *a*, *a*, and *b*, *b*, having different radii, in order to produce the recesses into which the roots descend, before they come under the operation of the knives.

Fig. 14, represents in perspective the cast-iron part of the drum with its axle, before the knives are attached. The knives, which are to be affixed to this rotary drum, are formed with two cutting edges at right angles to each other, or nearly so. The sort of knife which I recommend is shown detached from the machine at fig. 15; and fig. 16, is a similarly shaped

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knife, for the opposite side of the drum. A series of knives, like that shown at fig. 15, are to be affixed laterally to the steps of the drum at *c, c, c*, in fig. 12, by screws or other means; and another series of knives, as fig. 16, are to be in like manner attached to the steps *d, d, d*, on the reverse side of the drum; these steps being made parallel to the sides of the drum and to each other. The last knife of one of the series, forming the middle knife, must be reversed, and affixed to the middle plate of the drum.

When the knives have been thus secured, the curved plates *b, b*, are to be attached by bolts or screws to the cast-iron part of the drum, in order to make up the open portions of the drum, and form the larger radii of the periphery, coincident with the curved parts of the knives.

The rotary cutter thus constructed would then appear, as shown in perspective at fig. 17, and in revolving upon its axle, would bring the knives progressively into operation one after another; their upper cutting edges being all coincident in the same cylindrical curve, and their radial edges revolving in parallel circles at right angles to the axis of the drum.

It will now be perceived that when the turnips or other roots are introduced into the hopper of the machine, as shown in fig 12, they will fall down upon the periphery of the drum, which, receiving its rotary motion by means of a winch applied to its axle, will cause the knives to be brought successively into operation, and to cut the roots into strips or narrow pieces; which pieces or strips will pass through the apertures behind the knives into the interior of the drum, and will, from thence, fall through the shoot below on to

the floor, or into any vessel provided beneath to receive them.

By the construction of the knife shown, and the mode of attaching it to the drum, any one of the knives, if accidentally broken, may be replaced; but sometimes the knives are constructed by bending plates of steel in the form shown in perspective at fig. 18, the cutting edges being placed in the same relative positions as before described. When the plates are affixed to the cast-iron part of the drum, the curved part of the plates form that portion of the periphery of the drum marked *b*, in the former figure.

The Patentee wishes it to be understood, that he does not intend to confine himself to any precise number of cutters or knives to be affixed to a rotary drum, nor is it necessary at all times to employ two sets of cutters, as shown in the figures referred to; and though the knives have been described as placed in two series on opposite sides of the middle plate of the drum, yet the Patentee does not confine himself to that arrangement, as the knives are sometimes placed in a diagonal range along the drum from end to end, which would be illustrated by cutting the drum into two parallel portions at right angles to its axis in the dotted line shown in fig. 13.

The Patentee concludes by saying, that he wishes it to be understood that he claims the adaptation of the particular form of knife with two cutting edges, shown in the figures; and also the placing of those knives in diagonal ranges in the manner described, or any other suitable construction of knives, the faces of the radial cutting edges of which shall stand parallel to the ends of the drum, and to each other. An ex-

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ample of the adaptation of a series of straight knives so arranged, in conjunction with a diagonal cutting edge, is shown in the diagram, fig. 19.—[*Inrolled in the Inrolment Office, March,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To ROBERT WINCH, *of Gunpowder-alley, Shoe-lane, in the city of London, printers' joiner, for certain improvements in printing-presses.*—[Sealed 29th January, 1831.]

THE subject of this patent is what is usually denominated a printing machine, that is to say, an apparatus for printing, which is to be driven by steam or other power applied to a rotary axle actuating all the working parts, in distinction from those machines which are worked by hand, and called printing-presses.

Strong cast-iron side frames, braced together by transverse bars, support a flat stationary slab called the *table*, in the middle of which the *form* of types is to be fixed, and the *platen* or flat surface intended to press upon the types to give the impression is suspended over the *table*, and is brought down by means of crank-arms connected to a revolving axle.

The inking of the types is produced in the usual way by flexible rollers which receive the ink from a trough at each end of the frame, and having distributed it equally over their surfaces as they travel along by the ordinary means, they deposit the ink upon the face of the types, in order that it may be transferred from them to the sheet of paper when the platen is brought down to give the impression.

The sheets of paper to be printed are laid singly upon a frame called the *tympan* by hand, their positions being

adjusted by *register points* as usual, and when confined by the frame called the *frisket*, they are carried forward upon lateral rails or bars, and brought over the *form* of types, and under the *platen* by means of bands connected to excentric or elliptical pulleys, which causes the friskets to travel with differential motions.

In the progress of the *friskets* carrying the sheet of paper, it is made to descend for the purpose of bringing it under the *platen*, which is done by ratchet wheels and racks lowering the side-conducting rails at the proper time.

The drawings which accompany this specification, consisting of a great many figures, are exceedingly elaborate; and the description of the parts, their actions, and objects, with a multitude of letters and numbers of reference, give to the whole an appearance of very considerable complication. It will, however, we presume, by the foregoing epitome of the subject, be tolerably well understood in what way this improved machine is constructed; and we need scarcely add, that rotary power being applied to the main driving shaft, the various movements are produced through the agency of toothed gear, racks, bands, and pulleys.

We do not discover any particular features of novelty in the construction or arrangement of the parts, nor any advantage over those several plans of constructing printing machines, which are already known to the public through the pages of our Journal. We particularly allude, as nearest resembling that of the present Patentee, to those invented by Dr. Church, Mr. Applegath, and Mr. Wayte, which have formed the subjects of several patents, and will be found in our preceding volumes.

The Patentee says, in conclusion, I do not intend to claim any of the various parts of which my printing machine may be composed, which are already known or

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in use, but only in combination in the manner herein shown and described. I do however claim the manner of conveying the paper down to the surface of the types, by means of the descending frames or rails which support and carry the friskets, also the manner of carrying the friskets backward and forward, which is effected by means of the racks and ratchet wheels, and the excentric pulleys and bands.

The Patentee also claims "the means of actuating inking rollers," which is by a vibrating sequent rack taking into a pinion on the end of the axle of one of the rollers, and comes upon the main rotary shaft, which gives to the sector rack a reciprocating lateral movement for the purpose of distributing the ink; this, however, does not appear to be very clearly explained in the specification.

The Patentee says further, "I claim the manner of affixing the printing blanket under the platen by means of the frame before-mentioned." This we take to be, as a substitute for the ordinary blanket, a long sheet of paper extended under the surface of the platen, the ends of which are attached to and wound upon two rollers, and a click, as the evolutions of the machine goes on acting upon a ratchet wheel, at the end of one of these rollers, causes this *set-off sheet* to be gradually drawn forward, in order that it may not, by a particular part of it repeatedly coming against the same parts of the fresh printed sheets, take upon the ink, and thereby soil or reiterate the print in the future impression. Precisely the same contrivance, designed for the same purpose (being a sheet of calico), was applied to one of Dr. Church's presses ten years ago.

Lastly, the Patentee says, I claim the liberty of chang-

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ing the forms of the various parts, still, however, retaining their essential properties.—[*Inrolled in the Inrolment Office, July*, 1831.]

To Richard Walker, *of Birmingham, in the county of Warwick, manufacturer, for an improvement in wadding for fire-arms.*—[Sealed 26th June, 1834.]

This invention consists in the application of metallic discs (having apertures for the passage of air), for the purpose of wadding for fowling-pieces and other fire-arms. Fig. 20, Plate II., represents a circular disc of metal, which is made to the size required for the bore of the intended fowling-piece, and in such a manner as to touch the barrel all round, except at the parts *a, a,* which are apertures or openings, through which the air in the barrel passes, when wadding is rammed down. Fig. 21, is another disc, having holes at *b, b,* in place of the apertures *a, a,* which are cut out at the outer edges in fig. 20; and fig. 22, represents another disc, having short slits at *c, c,* instead of the apertures in figs. 20, and 21, at *a,* and *b.* It will be evident that it is not material what may be the shape or form of the openings or apertures, care always being taken that they are not made large enough to admit of the escape of the powder. Various advantages may be derived from the application of these metallic discs as wadding, for the purposes of sporting, instead of the wadding commonly used. Amongst other advantages will be the great compactness of the charge, in consequence of the close contact of the powder to the shot. It may also be desirable to observe, that in ramming down the metallic wadding,

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the interior of barrel will be materially cleansed after each successive discharge. The Patentee here observes, that he usually makes the above described metallic wadding by means of the ordinary fly-press, and that he generally makes the discs from plate or sheet brass (such brass being tinned), from one hundred to one hundred and twentieth of an inch in thickness.

The Patentee further remarks, that although he prefers brass, he does not intend to confine himself to that metal, because other metals, or compounds of metals, may also be made to answer the same purpose; care being taken that whatever metal is used for that purpose, its hardness shall not be such as to prevent the worm or screw of an ordinary ramrod from easily passing through it whenever it may be necessary to withdraw the charge; and it is also desirable that whatever metal may be used for that purpose, it should possess such a degree of elasticity, that should the disc or wadding be in the smallest degree larger than the bore of the barrel, it may offer such a resistance as to retain itself securely in the place to which it is forced by the ramrod; it may also be desirable to remark that lead should not be used, owing to its want of that degree of elasticity above described, but more particularly as it would add to that effect (called leading) usually produced by the shot when a fowling-piece is discharged, and which this improved wadding has a great tendency to remove.

The Patentee concludes by saying, that he confines himself to the application of metallic discs (having suitable apertures for the passage of air) for wadding for fowling-pieces, and other fire-arms, as above described.—[*Inrolled August* 22, 1832.]

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To WILLIAM HIRST, *of Leeds, in the county of York, clothier, for his invention of certain improvements in machinery for the better dressing and finishing woollen and other fabrics.*—[Sealed March 31, 1834.]

THESE improvements in machinery for the better dressing and finishing of woollen and other fabrics, consist in the construction of a machine or machinery possessing certain novel features, by means of which the pile is raised, that is, the end of the fibres of the wool or other material are drawn out upon the face of the cloth, with a superior effect to that of any other machine, which has been heretofore employed for the purpose of raising and dressing the pile or face of woollen, or other cloths or fabrics, by means of wire cards.

The general form of the machine, and the position of its several parts, may be considerably varied, and yet the essential novel features retained. The accompanying drawings, therefore, exhibit merely such an arrangement of the operative parts as have been found fully to answer the desired object; and after describing the machine, we will point out the peculiar novel features in which the present improvement consists; however, the position of the parts may be changed, or the general arrangements of the whole machine varied.

Fig. 1, Plate III., is a front elevation of the improved machine; fig. 2, a horizontal view of the same; fig. 3, is an end elevation; and fig. 4, a vertical section taken transversely through the middle: in which several figures the respective letters of reference point out the same parts of the machine.

The end frames or standards, *a*, *a*, *a*, upon which the bearings or axles of the sword rollers, and other parts of the machine, are supported, are braced together by

longitudinal bars or rails, *b*, *b*, secured by bolts and nuts, or by any other convenient means. An inclined scray, *c*, is placed below the machinery at the back part, for the purpose of conducting the cloth under operation in a perpetual or endless length on to the floor or board *d*, in order that it may be readily taken up, and passed between the rollers in front.

The cloth shown at *e*, *e*, *e*, in the section, fig. 4, is conducted lengthwise through the machine; first between the tension or retaining rollers, *f*, *f*, then over the breast beam or guide rail *g*, and under the cylindrical roller *h*, which is coated with wire cards, and guarded by the longitudinal rails *i*, *i*, mounted upon adjustable arms or bearings *j*, *j*, supported by screw shafts *k*, *k*, connected to the end frames of the machine. After passing under the card roller or cylinder *h*, and its guards *i*, *i*, the cloth is conducted over the carrying roller *l*, and from thence it is passed partly round the drawing roller *m*, and over the pressing roller *n*, from whence the cloth, as it proceeds, falls down into the scray *c*.

Rotary motion is given to the drawing roller *m*, by a wheel *o*, fixed upon its axle, the teeth of which take into an intermediate wheel *p*, driven by a pinion *q*, at the end of the main shaft *r*, the rotation of which causes the cloth to be drawn through the machine.

To the reverse end of this shaft *r*, the rigger *s*, is affixed, by which, through the agency of a band from a steam-engine, or any other first mover, the machine is driven. Upon the same shaft, *r*, there is also a wheel *t*, taking into the teeth of a pinion *u*, upon the axle of the card cylinder *h*; by means of which, as the shaft *r*, goes round, and the cloth is drawn progressively through the machine, the card cylinder *h*, is made to revolve with considerable rapidity.

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As the cloth in its progress passes under the guard rails *i, i,* the points of the cards of the rapidly revolving card cylinder *h,* act upon a small extent only of the surface or face of the cloth, (limited by the guard rails or protectors *i, i,*) and in so acting draw out the pile or fibres of the wool, or whatever materials the cloth is made of, and produce the nap or fibrous surface, ready to be cropped or shorn.

In order to show more particularly the construction of that part of the machine in which the improvement principally consists, there is represented upon an enlarged scale at fig. 5, an end view, and at fig. 6, a section of the card cylinder *h,* with the guard rails or protectors *i, i,* and the arms or bearings *j, j,* by which they are supported, and the mode of adjusting them by the screw shafts *k, k,* and *x*; that is, shifting the situation of the guard rails or protectors, for the purpose of allowing a greater or less extent of the surface of the cloth to be brought under the operation of the card cylinder as it revolves, and also to cause the cloth to bear with more or less pressure against the points of the wire cards.

The axle of the card cylinder *h,* being mounted in plummer blocks, *v, v,* fixed upon the end frames of the machine, that cylinder will revolve, and not shift its situation; but the arms *j, j,* on which the guard rails or protectors *i, i,* are mounted, being confined between vertical ribs, *w, w,* they are enabled to rise or fall by turning the screw shafts *k, k,* mounted in the end frames of the machine, which it will be perceived cause the guard rails or protectors *i, i,* to approach nearer to, or recede farther from, the card cylinder *h,* in order to determine the extent of the surface of the cloth which the rotary cards shall be allowed to act upon, and also to regulate the pressure of the cloth against the cards. There is like-

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wise a horizontal screw shaft *x*, for the purpose of effecting a small degree of lateral adjustment.

Having described these improvements, the Patentee wishes it to be understood, that he does not intend to confine himself to the particular arrangement set out in the figures of the several parts of the machine for raising the pile of woollen and other fabrics, nor to their comparative dimensions; but he finds that a card cylinder of from two to six inches diameter answers the purpose best, and which he prefers to be made of metal turned perfectly true, and covered with sheet cards or fillets of cards coiled round the cylinder; and he does not confine himself to the employment of any particular sort of cards, as that must depend upon the quality and condition of the cloths to be put under operation, and will readily suggest itself to any competent workman, but the points of the cards should be rendered sharp by grinding.

The Patentee concludes by saying, that that which he particularly claims as his invention, and forming the essential feature of these improvements, is the adaptation of guard rails or protectors in the way shown, which should be made of metal, and formed perfectly straight and true, and placed parallel to the cylinder for the purpose of limiting the extent of action and pressure of the cards upon the face of the cloth as it passes under, and which he prefers to do by making those guards or protectors adjustable, so as to allow the points of the cards to penetrate into the face of the cloth only to such depths as circumstances may require without injury to the fabric.—[*Inrolled in the Rolls Chapel Office, September,* 1834.]

Specification drawn by Messrs. Newton and Berry.

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To Goldsworthy Gurney, *of Bude, Cornwall, Esq., for his invention of certain improvements in musical instruments.*—[Sealed October 18, 1833.]

This invention consists in the employment of bent rods of glass, or other sonorous material, in place of strings, for producing harmonious sounds in a piano-forte, and other musical instruments of that kind.

The Patentee states, that instead of strings of gut, wire, or straight rods of metal, he employs glass or metal rods, or bars, whether of steel, iron, copper, brass, or any other material fit for the purpose, which he curves or binds at a certain point equi-distant from the ends of the said bars or rods into a certain shape, represented in the drawing; and that having so prepared the said rods, he secures them to a bridge or bar of wood, or metal, fixed in front of a sounding board.

Plate III., fig. 7, represents a section, taken transversely through a piano-forte, representing the form and situations of the movement keys and sounding bars. The sounding board *a*, forms the back of the instrument, across the middle of which the bridge *b*, is extended, carrying the sounding bars *c*, placed in a row, and answering to the keys.

The following is the Patentee's description of its construction:—"A hole is made through the bridge *b*, and sounding board *a*, through which the two ends of a metal wire or string are passed, after having been bent over the centre of the bent bar or rod *c*, to the back of the sound board, as shown at *p*. A steel spring *q*, about six inches long, and an eighth of an inch square, is placed upright against the back of the sound board *r*, and the ends of the wire or string are twisted or tied together over it.

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"One end of the spring *q*, is thus drawn away from the sound board, the other end still resting against it, until a sufficient tension or binding action is produced by the wire, to fix the bent bar *c*, against the front of the bridge *b*, when a wedge *r*, must be introduced between this end of the spring *q*, and the sound board, to preserve or continue a uniform tension, sufficient to prevent the bent bars or rods *c*, from shifting their position when struck by the hammers.

"The hammer is shown at *l*, hinged to a rail *h*, and is raised by a hopper *k*, at the end of the lever or key *g*; which key is to be acted upon by the finger of the performer in the ordinary way of playing a piano-forte or organ, which will cause the hammer to strike one end of the bent bar *c*."

A piece of wood *u*, is placed under the end of the hammer to give it weight, the size of which is to be regulated according to the size of the sonorous bars or rods *e*, employed, which must be at the will of the manufacturer, so as to bring out a tone most desirable in his judgment.

"The head of the hammer is to be covered with cloth, soft leather, or Indian rubber, about a sixteenth of an inch in thickness, more or less, according to the taste of the manufacturer.

"The rail *h*, is affixed between screwed nuts upon the upper end of a screwed wire or rod *o*, which is passed between the keys, and affixed to the key board, *t*, of the instrument, in the usual way of piano-forte makers.

"If dampers, to shorten the time of the vibrations of the bars or rods *c*, are required, or desired by the manufacturer, they may be affixed in the following

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manner:—d, is a damper, hinged to the upper edge of the rail f, and shown as resting upon the bar or rod c; it is elevated or lifted off the rod in playing by means of a connecting rod e, hinged to the damper d, and resting in a notch or gap formed to receive it on the upper part of the stem of the hammer e."

The Patentee goes on to say, that having described the construction and arrangement of the parts which produce a single note, "I now declare that every rod or bar c, in succession, may be affixed and acted upon in a similar manner down to the bass, and upward to the treble, throughout the whole compass of the instrument; and which compass may be limited or extended, more or less, from six octaves.

"The size of the bent bars or rods c, may be varied, in order to produce different qualities of tones at the will of the manufacturer. The sectional form of them may be either round, square, oval, flat, or of any other form.

"These different sectional shapes afford somewhat different qualities of tone, either of which may be employed at the pleasure of the manufacturer. Those which I now employ are made cylindrical, and about a quarter of an inch in diameter in the bass part of the instrument, and gradually becoming smaller and shorter toward the treble, terminating in about an eighth of an inch.

"The lengths of the bent bars or rods depend on their actual sizes, the kind of metal, and the pitch required. Those above are of steel, and about two inches and a half in length at the highest note of the treble, and increasing gradually in length toward the bass, the lowest of which is about twenty inches long, the instrument having the compass of six octaves.

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"The curvature or bending of each rod or bar *c*, widens toward the bass, more or less, according to the ear or taste of the manufacturer, or agreeably to the louder or softer quality of tone required.

"The rods or bars are tuned by filing their ends, so as to shorten their lengths, by which means their tones become higher in pitch, by filing the heel or central part of the bend of the rods or bars thinner.

"The great improvement effected in this instrument, consists in substituting curved bars or rods *c*, for stretched strings, or wires, tuning forks, or straight bar rods or plates, as used in the various musical instruments now or heretofore invented or in use.

"Glass rods or bars must be curved and mounted in a similar way to the metallic ones, only they require to be increased in diameter."

The Patentee concludes by saying, "Having thus described the manner of carrying my said invention into effect, I declare that I do not mean to claim as my invention any of the parts which may have been already known or in use, but only the manner of adapting them to my said invention, and which invention consists in the application of the aforesaid curved rods or bars of glass, metal, or alloys, or mixtures of metal, in the manner hereinbefore described, to the improving of musical instruments.—[*Inrolled in the Inrolment Office, April*, 1834.]

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To BENJAMIN HICK, *of Bolton-le-Moors, in the county palatine of Lancaster, engineer,* EDWARD EVANS *(the elder), of Oldham, in the said county, coal proprietor, and* JOHN HIGGENS, *of Oldham, aforesaid, engineer, for their invention of certain improvements in the construction and adaptation of metallic packings for the pistons of steam and other engines, pumps, and other purposes to which the same may be applicable.*—[Sealed July 4, 1834.]

THIS improved metallic piston consists principally of rings formed and placed on the block of the piston, in such a manner as effectually to prevent the passage of steam between the piston and the cylinder within which it works. It is also applicable to the air pumps of steam-engines, blowing cylinders, water and other pumps, whose dimensions require their buckets to be packed with hemp, or other vegetable substances. This piston is distinguished from the metallic pistons in common use, by its not requiring springs or other distinct mechanical contrivances to press the rings outwards, in order to keep them in sufficiently close contact with the cylinder or barrel. This purpose is effected in the improved piston by the gravitating action of the rings themselves, which repose freely on an inclined bed, turned on the block of the piston, and are thus impelled, by their own weight, against the cylinder or pump barrel, with the requisite degree of force, to ensure tightness. This principle of obtaining tightness laterally through the action of gravity, or, in other words, through the tendency of the rings, to descend on the block of the piston, is susceptible of many modifications in practice.

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Fig. 8, Plate III., exhibits two modes of constructing the pistons of steam-engine cylinders, and a third mode suited to an air-pump bucket. The piston represented in the figures is thirty-two inches in diameter. The angle made by the bed of the piston block *b*, *b*, and also by the corresponding face of the rings *c*, *d*, with the cylinder *e*, *e*, is in figs. 8, 9, 10, 11, 12, and 13, about fifty-five degrees. The weight of the rings in cast-iron is about one hundred and fifty pounds. The angle of the rings and their weight, above assigned, are proper for condensing engines, worked by steam, of the ordinary pressure; but for condensing or non-condensing engines, worked by steam, termed high-pressure, it will be requisite to increase the pressure of the rings of the piston against the cylinder. This may readily be accomplished, either by diminishing the angle of the rings, and of the bed or seat on which they rest, or by increasing the weight of the rings themselves. Fig. 8, is a plan view of the upper part of the piston. Fig. 9, is a section of the rings and cover through the line *x*, *x*, fig. 8. Fig. 10, is a section of the rings and cover through the line *y*, *y*, fig. 8. Fig. 11, is a plan view of the piston, with its cover removed, showing the upper surface of the rings *c*. The same letters refer to similar parts in all the figures: *b*, *b*, is the central block of the piston, which is made fast to the conical end of the piston rod *a*, in the usual manner; *c*, *d*, are two separate rings of cast-iron, brass, or other metal, accurately turned and ground together; they are also accurately turned and ground to fit the piston block *b*, *b*, and the cylinder *e*, *e*. The rings *c*, *d*, after being thus fitted and ground, are each cut into three, four, or more equal parts or segments, in proportion to the diameter of the cylinder,

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and are placed together in such way that the joints of the one ring cross the joints of the other, as seen in fig. 11, and effectually prevent the passage of steam, air, or other fluids. In order to stop any motion which the rings might acquire round the block of the piston, the pin *f*, is fixed in the block, which enters into a mortice, formed in the ring *c*, allowing sufficient play therein not to impede the free descent of the rings on the angular bed of the block; and in order to prevent the motion of the ring *d*, round the ring *c*, a similar pin is introduced to unite them.

The cover *g*, is accurately fitted to the block of the piston, and secured to it by the four bolts *h*, *h*, *h*, *h*. The cover is prevented from pressing upon the rings by the four setting screws *i*, *i*, *i*, *i*, which are screwed into and through the cover, so that their ends project and rest upon the solid block. Thus the cover *g*, can be adjusted, so as to be brought so near to the rings, that no dirt can enter between it and them, and yet be prevented from pressing upon the rings; and as the rings or segments wear away, the cover can be followed down in proportion. A recess *k*, *k*, is formed in the upper part of the cover, in order to hold a small quantity of hemp or other vegetable packing, for the purpose of retaining a portion of the condensed steam, or of the oil or grease occasionally used in lubricating the piston and cylinder. This packing is held down by a wrought-iron ring *l*, *l*, which is secured to the cover *g*, by eight small screws *m*, *m*. A modification of the piston above described is exhibited in fig. 12, wherein it will be seen that we employ three rings *c*, *d*, *n*; two of which, *c*, *d*, rest upon a flat base, turned on the block, instead of an angular one; the lateral pressure against the cylinder or barrel being in this case obtained by the gravity

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of the wedge-shaped entire ring of metal *n*, fitted and ground to a corresponding angle in the internal face of the ring *c*, and to the vertical face of the block of the piston. Fig. 13, represents an external elevation of the piston completely fitted for work. Figs. 14, 15, and 16, represent a third modification of the gravitating piston rings, as applied to, and suitable for, an air-pump bucket. The construction of the rings or segments is similar to those of the piston in figs. 8, 9, 10, 11, and 12; but it being important in the air-pump buckets of steam-engines, and in other pump buckets, that the water-way should be as large as possible, the rings or segments require to be as narrow on their resting surface as they can be conveniently made. In order, therefore, to give them sufficient pressure against the working barrel, an entire metallic ring *o*, *o*, is placed upon them, accurately ground and fitted both to the upper surface of the ring of segments, and to the vertical face of the bucket. In lieu of a cover, as represented for the steam piston, the rings of this bucket are kept from rising by the four setting screws *p*, *p*, *p*, *p*, screwed through the projecting arms of the brass bars *q*, *q*, in which the ends of the bucket lids *r*, *r*, work; which screws can be adjusted, so as not to press upon the rings, and yet prevent them from rising out of their place, should any dirt or extraneous matter intervene between them and the barrel.

The Patentees do not claim as any part of their invention, the general form of the steam piston, or air-pump bucket, herein described; but they do claim the application of metallic rings to pistons resting upon inclined planes, or acted upon by them, and so contrived as to be steam, air, or water-tight (in the common language of engineers), through the simple action

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of their own gravity, unaided by other mechanical forces.

The Patentees conclude by saying, that they do not limit their claim to the invention of the three particular pistons hereinbefore represented and described; but have illustrated them as the three best and most efficient modes of construction on this principle with which we are acquainted.—[*Inrolled in the Rolls Chapel Office, January,* 1835.]

To WILLIAM GRAHAM *the younger, of the city of Glasgow, cotton spinner and power-loom manufacturer, for a self-acting temple, to be used in the operation of weaving by power or hand-loom.*—[Sealed 22d May, 1833.]

TEMPLES are apparatus to be attached to looms, for the purpose of keeping the cloth, as it is produced in the loom, distended to its full width, in order to prevent the warp yarns being abraded by the friction of the vibratory reed, which would be the case if the cloth were allowed to shrink up in width.

In hand-looms, the temples are formed by a stretcher of wood extended across the loom in form of the lathe, the ends of the stretcher having points which are set into the lists or selvages of the cloth, and thereby keep it tightly extended to one regular width. But as the cloth is progressively made and moved forward over the breast beam of the loom, it is necessary that the weaver should very frequently shift the position of the temple (stretcher), and place it nearer to the lathe and reed; which is an operation that takes some time, and interrupts the progress of the work.

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In power-looms, the want of a self-acting temple is attended with considerable inconvenience, as, without such an apparatus, each loom must be constantly watched by an attendant, and therefore several plans have been devised; as, revolving stars placed in such positions as should cause the points to take into the lists or selvages of the cloth, and keep it at all times distended. None of these plans, however, have been found to answer the purpose so well as the American *nipper temples*, which forms the subject of this patent.

Plate III., fig. 17, shows one of the nipper temples in its horizontal position, and fig. 17*, the same, edgewise. One of these nippers is to be fixed near each end of the breast beam, and it is intended to be acted upon by the swinging of the lathe, which shall open the chaps of the nippers at every operation of beating up, and thereby release the cloth, and allow it to be slidden forward over the breast beam by the force of the reed.

The plate *a*, to which the nippers are attached, is to be fixed to the breast beam of the loom *b*, *b*, by means of a screw-bolt passed through the breast beam as shown; and when different widths of fabric are required to be woven in the same loom, the temples must be shifted nearer toward or farther from the ends of the breast beam, which may be done by means of a long slot, in the plate shown by dots.

Toward the outer end of the plate *a*, a bar *c*, is attached, which is turned up at the end, and bent back to form the upper chap *d*, of the nippers. The lower chap *e*, forms part of a spring-piece affixed to the bar *c*, and is pressed up by its spring against the upper chap *d*; the inner surfaces of both being notched, or cut like a file, in order to enable them to hold fast. Between

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these two chaps the list or selvage of the cloth is passed, and being thus held by the nippers on each side of the loom, the cloth is kept extended to its proper width.

A horizontal lever *f*, *f*, turns upon a fulcrum pin *g*, fixed in the plate *a*; and at one end of this lever there is a broad piece *h*, hanging down, and at the other end a wedge or knife-edged tooth *i*, projecting.

The under part of the front of the lathe is partially represented at *k*, *k*, which, when it goes forward to beat up the work, strikes against the end *h*, of the lever *f*, and causes the wedge, or knife-edged tooth *i*, at the reverse end, to be forced in between the chaps *d*, *e*; which thereby opens the chaps, and releases the cloth at the moment that the work is beaten up, and allows the reed to drive the cloth forward over the work beam as usual. But the instant that the lathe recedes, the tooth *i*, slips back out of the chaps of the temple, and the cloth is held tightly as before.

In this way the nippers act at every stroke of the lathe, opening to relieve the cloth and closing again to keep it at tension, and thus constitute self-acting or perpetual temples.

The Patentee says, that he has not thought it necessary to show a loom of any of the various constructions known, as the invention only relates to the part described, which any competent mechanist (weaver, we presume,) will readily construct and apply.—[*Inrolled in the Inrolment Office, November,* 1833.]

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To Peter Wright, *of the city of Edinburgh, manufacturer, for his invention of an improved method of spinning, twisting, and twining cotton, flax, silk, wool, or any other suitable substances.*—[Sealed July 17, 1834.]

The impracticability of spinning fine and soft yarns at any very considerable speed by means of a flyer, as in the throstle frame, is well known to practical spinners, arising from the tension or strain to which the yarn must necessarily be subjected in dragging round the bobbin or spool on which it is intended to be wound, and the consequent liability of breaking the yarn, or separating the fibres. This objection to the flyer has hitherto, in a great measure, confined its employment to the spinning of hard twisted yarns of coarse, or what are denominated low, numbers. To obviate, therefore, this difficulty, in connexion with throstle spinning, is a principal object of my improvement; and which consists in a means or method of relieving and regulating the tension or strain, sustained by the yarn in overcoming the friction of the bobbin or spool. This object is effected by giving to the spindle, which carries the bobbin, a distinct rotary movement from that by which the flyer is driven. These distinct movements are communicated to the bobbins and flyers respectively, through the agency of bands, from separate and distinct driving drums; by means of which the Patentee is enabled to drive the bobbins in the same direction as the flyers, with a different speed from that of the flyers, and by regulating these differences of speed, to allow more or less friction to operate upon the bobbins, and thereby to temper or regulate the taking up drag, according to the strength of the yarn intended to be wound upon the barrels of such bobbins or spools. In the accompanying figures,

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fig. 18, Plate III., is a front elevation of part of a throstle frame, in which several bobbins and flyers are shown mounted upon the improved plan; fig. 19, is a transverse section of the same, showing the situations of the distinct driving drums, and the manner in which the bands are passed from one of the drums to the wharves, whirls, or pulleys of the bobbin spindles, and from the other drum to the wharves of the flyer spindles; fig. 20, represents a bobbin and flyer upon a larger scale, mounted on my improved plan; and fig. 21, shows the same in vertical section, taken through the middle of the bobbin and flyer, and their spindles and wharves; fig. 22, represents the same as fig. 20, except that, in this instance, a spool is substituted for the bobbin, and the arms of the flyer are extended in length: *a*, is a hollow spindle, mounted in the stationary rails *b*, *b*, in front of the machine, having a wharve, whirl, or pulley *c*, firmly fixed upon it. The manner in which these hollow spindles are secured in the rails, will be perceived by reference to fig. 20. Conical apertures are made through the rails *b*, *b*, with bushes or collars *d*, *d*, fitted therein, the external figures of which are conical, corresponding with the apertures in the rails; but the internal forms of the bushes or collars are truly cylindrical, accurately fitting the journals of the spindle. In order to mount these spindles in the rails *b*, *b*, the bush or collar *d*, having been secured in the lower rail, the top end of the spindle *a*, is passed upwards through the aperture in the upper rail, and then, being brought into a perpendicular position, the bottom end of the spindle is inserted into the socket or bush *d*, of the lower rail, the shoulder of the spindle bearing upon the top of the bush. The other bush or collar is then put over the top end of the spindle, and driven down into

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the conical aperture of the upper rail; by means of which the spindle becomes firmly secured in the rails, but is allowed to turn freely. The bottom end of the spindle *a*, is slightly conical on its outer surface, and the aperture *e*, in the centre of the neck of the flyer *f*, *f*, is made conical also, to correspond; the flyer may therefore be securely attached to the hollow spindle, by pressing its aperture *e*, on to the conical end of the spindle *a*; and they will, by this mode of attachment, be more accurately connected than by any other means; and by the adhesion of the surfaces, be firmly held together, without any other mode of fastening. The bottom spindle *g*, is mounted in the two parallel traverse or copping rails *h*, *h*, in a perpendicular position, coincident with the centre of the flyer spindle. Upon this spindle *g*, is firmly fixed a wharve, whirl, or pulley, *i*. The lower end of this spindle bears in a cup or step *k*, having an adjustable screw *l*, at bottom to determine its height; a journal toward the upper part of the spindle *g*, turns in a bush, fixed in the upper copping rail *h*, which rail, being raised to introduce the spindle, its top end is passed through, and being thus mounted in its bearings, the spindle is enabled to revolve freely. A disc *m*, is fixed upon the spindle above the copping rail, for the purpose of supporting the bobbin or spool *n*, placed loosely upon the spindle, with a washer or collar of cloth, or other suitable material, intervening between the disc and bobbin for the purpose of regulating the friction of the bobbin when dragged round upon the spindle.

The bands being now extended from the driving drum *o*, over the wharves *c*, of the flyer spindles, as shown in fig. 19, and the other bands from the drum *p*, over the wharves *i*, of the bobbin spindle, the machine

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is in a condition for working. The yarns delivered from the front, drawing rollers in the usual manner, proceed downwards, and pass through the hollow spindles *a*, to the flyers *f*, and being conducted by hooks on the arms of the flyers, and by the scrolls at their ends, are thence led off to the barrels of the bobbins or spools.

The machine being now put into operation, the flyer spindles *a*, are made to revolve with such a speed as may be deemed desirable, according to the kind of yarn intended to be spun; the spindles *g*, carrying the bobbins, are also driven, but by a different speed, in order that the rotation of the bobbins may vary from that of the flyers, for the purpose of causing the yarns to wind on to the barrels of the bobbins or spools, as the rotation of the flyers spin or twist their fibres. The proportions of speed between the bobbin and the flyer may be exactly equivalent to the taking up or winding on; but in that case there would be no drag on the bobbin by the tension of the yarn. As, however, it is not the intention of the Patentee, in taking up or winding on the yarns, to dispense with a drag upon the bobbin, he makes the speed of the bobbins, and that of the flyers, sufficiently dissimilar to produce a sensible drag; and, in order to regulate or qualify that drag, according to the strength of the yarns intended to be spun, such speed is given to the bobbin spindles as circumstances may require, compared to the speed of the flyers; and thus the Patentee is enabled to temper or qualify the drag to suit any kind or quality, or number of yarns spun by a flyer in a machine of the description of the throstle frame: the speed of the driving drums *o*, and *p*, being, of course, determined by the diameters of the wheels employed to actuate them.

A mode of adapting a pendant flyer to a throstle

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frame, in which the bobbin turns on a fixed spindle is shown at fig. 23, which is a front view of part of a throstle frame so constructed; and fig. 24, is a transverse section of the same. The pendant flyer adapted to a bobbin, turning upon a stationary spindle, is shown in fig. 25, and the same adapted to a spool is represented in fig. 26. The bobbin being represented in vertical section at fig. 27, and the spool at fig. 28.

The flyer and its spindle is constructed and mounted in the two fixed parallel rails exactly in the manner described above. The bobbin or the spool fits loosely on to a stationary spindle fixed by an adjusting screw in the copping rail, in the way shown in these last mentioned figures; and rotary motion being given by the driving drum to the spindle of the flyer, the yarn, by its tension, will drag round the bobbin or spool, and the taking up or winding on will be affected by the friction, which retards its rotation.

By this last described arrangement, the spindle upon which the bobbin is drawn round being firmly fixed to the copping rail, the bobbin will move with the utmost steadiness, and not be subject to that vibratory action which would occur if it had connexion with the rotary motion of the flyer; and by the mode of appending the flyer to the hollow spindle by conical surfaces, and supporting the spindle in the two parallel rails, as exhibited in the drawings, the flyers will be brought so near their bearings, that they will be enabled to revolve with the greatest speed, without being subject to shake or vibration.

Having now described the improved method of spinning, twisting, and twining cotton, flax, silk, wool, or any other suitable substance, the Patentee desires it to be

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understood, that his claims of improvement consists, first, in the method described of giving to the flyers; and to the bobbins of a throstle frame, or other similar machinery for spinning and doubling yarns, or threads, distinct and dissimilar rotary motion, for the purpose of regulating the tension or drag sustained by the yarns or threads in winding on to bobbins or spools. Secondly, the peculiar construction and mode of connexion of the flyer and its spindle; and, thirdly, the adaptation and combination of stationary spindles, with the improved pendant flyer as described.—[*Inrolled in the Rolls Chapel Office, January* 17, 1835.]

Specification drawn by Messrs. Newton and Berry.

MISCELLANEOUS.

WATER OBTAINED BY BORING.

Artesian wells have been very successfully constructed in some parts of France. A letter from M. Jauburt de Passa to Viscount Hericart de Thury, describes a bored well, remarkable for the abundance of water which it supplies. It was made by M. Durand, two leagues south-east of Perpignan.

The sound, after penetrating to the depth of eighty feet, through alternate beds of marl and clay, entered bed of sandy marl, three feet thick, from which issued a jet of water, very clear, but, from the peculiarity of its taste, unfit for drinking. Its temperature was 14°.5 Reaumur (=65° Fahrenheit), and it rose from three to four feet above the surface.

A second boring, undertaken at the distance of six feet from the first, gave, at the same depth, a jet of water, but the first jet diminished, and the quantity of

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water from both was less than that which first issued from the former. The boring of the latter was then continued to the depth of one hundred and forty-five feet, when the sound began to sink of itself, and when precipitately withdrawn, the water rushed up to the height of five feet, and astonished all by its abundance and force. No obstacle could restrain it. No direct attempt was made to determine the maximum height to which it might rise, but fifty feet was decreed to be fully within the limits of its ascending force.

At the time the letter was written, several weeks after the first issue of the water, it continued to flow with the same violence, and with rather increased quantity. From the dimensions and velocity of the current, it appeared to supply four hundred and thirty gallons per minute, or two thousand eight hundred and eighty cubic metres per day. A leaden weight of eight pounds, supported by a string being placed in the tube, was rapidly thrown out by the water.

The water, which at first had a peculiar taste, but not disagreeable, is now very limpid and insipid, and its temperature 66 degrees of Fahrenheit. The total expense of the well was two hundred and sixty-three francs.—*Bull. D'Encouragement, Sept.*, 1833.

THE MAIDSTONE IGUANODON.

By a letter from Mr. Mantell, dated October 4, 1834, we learn that the fine specimen containing the fossil bones mentioned in his communication, p. 355, has been generously presented to him by some of his friends, who purchased it in its mutilated state for 25*l.* It has been chiselled out, and the pieces joined; many new bones have been developed, and it now forms one

of the finest specimens in Europe. A particular report of it may be expected; but, in the mean time, it is ascertained that the hind feet of the Iguanodon "were very large, flat, and enormously strong, as might indeed, *à priori*, be supposed. The large metatarsal bones, which Cuvier says so much resemble those of the Hippopotamus, belong to the hind feet only; the metatarsal are long and slender, as in the recent Iguana." Mr. Mantell has been able to replace the fragments of the femur, previously broken into one hundred pieces, and to repair and make it quite perfect: this femur is three feet eight inches long, although shortened somewhat by compression.

A model has been made of the lower extremity of the femur of this Colossus of the reptile world.—*American Journal of Science and Arts.*

New Patents

SEALED IN ENGLAND,

1835.

To John Hothersall Hallet, of Haven Cliff, in the parish of Axmouth, in the county of Devon, Esq., for his invention of an improvement in the construction or manufacture of cocks or taps for drawing off fluids.—Sealed 25th February—2 months for inrolment.

To Joshua Taylor Beale, of Church-lane, Whitechapel, in the county of Middlesex, engineer, for his invention of a simplified and economical steam-engine, which engine may be used for other purposes.—Sealed 27th February—6 months for inrolment.

To John Levers, of New Radford, in the county of

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Nottingham, machine-maker, and James Pedder, of the same place, lace-maker, for their invention of certain improvements in machinery for making bobbin-net lace.—Sealed 27th February—6 months for inrolment.

To Frederick Ludwig Hahn Danchell, of Great Marlborough-street, in the county of Middlesex, musical instrument-maker, for certain improvements in piano-fortes, being a communication partly from his partner, Frederick George Geiner, a foreigner residing abroad.—Sealed 28th February—6 months for inrolment.*

To Robert Wolf, of Cornhill, in the city of London, musical instrument-maker, for an improvement in piano-fortes, consisting in the new construction on the principle of acoustics of a sounding body, applicable to every description of piano-fortes.—Sealed 2d March—6 months for inrolment.†

To Thomas Fleming Bergin, of Fair-view Avenue, in the county of Dublin, gentleman, for his invention of improvements in railway carriages, which improvements are applicable to other purposes.—Sealed 4th March—2 months for inrolment.

To John Prince, of Bread-street, Cheapside, in the city of London, agent, for his invention of an improved mould and apparatus to be used in making paper.—Sealed 4th March—6 months for inrolment.

To John Joseph Charles Sheridan, of Walworth, in the county of Surrey, chemist, for his invention of cer-

* This patent, being in litigation, was not sealed till 28th February; but it bears date 1st of September, 1834, by order of the Lord Chancellor.

† This patent, with the above, being in litigation, was not sealed till 2nd of March, but it bears date 6th of November, by order of the Lord Chancellor.

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tain improvements in the several processes of saccharine, vinous, and acetous fermentation.—Sealed 9th March—6 months for inrolment.

To Herman Hendriks, of Grove-house, Blackheath, Esq., for his invention of improvements in dying.—Sealed 11th March—6 months for inrolment.

To Joshua Butters Bacon, of Sidmouth-street, Regent's-square, in the county of Middlesex, gentleman, for improvements in the construction of locomotive steam-carriages, applicable to railways and common roads, being a communication from a foreigner residing abroad.—Sealed 11th March—6 months for inrolment.

To William Hale, of Colchester, in the county of Essex, civil engineer, for his invention of certain improvements in, or additions to, boilers or apparatus for producing motive power.—Sealed 11th March—6 months for inrolment.

To William Newton, of Chancery-lane, in the county of Middlesex, civil engineer, for a method of preparing animal milk, and bringing it into such a state as shall allow of its being preserved, for any length of time, with its nutritive properties, and capable of being transported to any climate for domestic or medicinal uses, being a communication from a foreigner residing abroad.—Sealed 11th March—6 months for inrolment.

To Robert Jupe, of New Bond-street, in the parish of St. George, Hanover-square, in the county of Middlesex, upholsterer, for his invention of an improved expanding table.—Sealed 11th March—6 months for inrolment.

To John Sylvester, of Great Russell-street, in the county of Middlesex, civil engineer, for his invention of improvements in apparatus, used in the communication or transmission of heat to aeriform, liquid, and

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solid bodies.—Sealed 11th March—6 months for inrolment.

To William Bridges Adams, of Long-acre, in the parish of St. Martin's-in-the-Fields, in the county of Middlesex, coach-maker, for his invention of an improved construction of wheels for all kinds of carriages in which springs are commonly used.—Sealed 13th March—2 months for inrolment.

To William Church, of Heywood-house, Bordesley-green, in the county of Warwick, gentleman, for his invention of certain improvements in apparatus to be employed in the conveyance of goods and passengers by land or water; parts of which said improvements are also applicable to the ordinary purposes of steam-engines, and other steam apparatus.—Sealed 16th March—6 months for inrolment.

To Richard Hill, of Birmingham, in the county of Warwick, merchant, for an improvement in door and other locks, and in staples used therewith.—Sealed 18th March—6 months for inrolment.

To Andrew Smith, of Belper, in the county of Derby, millwright and engineer, for his invention of a certain improvement or improvements in printing machines.—Sealed 18th March—6 months for inrolment.

To James Hunter, of Ley's Mill, Arbroath, in the county of Torfar, North Britain, mechanic, for his invention of certain improvements in the art of cutting, or what is commonly called facing and dressing certain kinds of stone.—Sealed 18th March—6 months for inrolment.

To Henry Walker Wood, of Austin-friars, in the city of London, merchant, for an improvement in obtaining certain oils, being a communication from a

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foreigner residing abroad.—Sealed 18th March—6 months for inrolment.

To William Weekes, of King Stanley, in the county or Gloucester, clothier, for his invention of improved machinery for cleansing, plaining, polishing, and dressing woollen and other cloths.—Sealed 25th March—6 months for inrolment.

To Joseph Barker, of Southampton-street, Camberwell, in the county of Surrey, gentleman, for an improvement in the constructing of umbrellas and parasols.—Sealed 25th March—6 months for inrolment.

To James Berrie and David Anderson, both of the city of Glasgow, in Scotland, manufacturers, for their invention of certain machinery for making a new or improved description of heddles or healds.—Sealed 25th March—6 months for inrolment.

To John Brunton, of West Bromwich, in the county of Stafford, engineer, for his invention of certain improvements in the construction of retorts for generating gas, for the purpose of illumination.—Sealed 25th March—6 months for inrolment.

To William Houstoun, of Fleet-street, in the city of London, printer, for his invention of certain improvements in tools, implements, or apparatus, which are either used in or subservient to the art of letter-press printing.—Sealed 25th March—6 months for inrolment.

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CELESTIAL PHENOMENA, for April, 1835.

D.	H.	M.	
			Clock before the ⊙ 4m. 6s.
—			☽ rises 7 h. 4 m. M.
—			☽ passes the mer. 2h. 29m. A.
—			☽ sets 10 h. 9 m. A.
2			Occul. ω^2 Tauri, im. 11h. 7m.
	22	21	♀ in the descending node.
3	9	2	♀ in conj. with ♅ diff. of dec. 0. 44. S.
		41	♃'s third sat. will im.
5			Clock before the ⊙ 2 m. 54 s.
—			☽ rises 8 h. 59 m. M.
—			☽ passes the mer. 5h. 41m. A.
—			☽ sets 1 h. 28 m. M.
—			Occul. ε Geminorum, im. 4 h. 50 m., em. 6 h. 11 m.
	21	31	☽ in □ or first quarter.
	23	13	♂ in conj. with the ☽ diff. of dec. 0. 46. S.
6	5	36	☿ in Aphelion.
7	14	52	♂ in quad. with the ⊙
	15	42	☿ greatest elong. 27. 44. W.
9			Occul. ι Lionis, im. 8h. 10m., em. 9h. 23m.
	22	27	♄ opposition to the ⊙
10			Clock before the ⊙ 1 m. 28 s.
—			☽ rises 2 h. 55 m. A.
—			☽ passes the mer. 10h. 7m. A.
—			☽ sets 4 h. 40 m. M.
12			Occul. *Saturn*, im. 14h. 19m., em. 15 h. 8 m.
	13	46	♄ in conj. with the ☽ diff. of dec. 1. 16. S.
	—		Occul. 65 Virginis, im. 12 h. 47m.
	—		Occul. 66 Virginis, im. 13 h. 34 m.
	19	6	Ecliptic oppo. or ○ full moon.
13	10		☽ in Perigee.
14			Mer. R. A. 7 h. 14 m. dec. 23. 54. N.
	—		Ven. R. A. 22 h. 52 m. dec. 7. 59. S.
	—		Mars R. A. 7 h. 29 m. dec. 24. 4. N.
	—		Vesta R. A. 4 h. 48 m. dec. 21. 8. N.
	—		Juno R. A. 6 h. 33 m. dec. 1. 47. N.

D.	H.	M.	
14			Pallas R. A. 17 h. 35 m. dec. 18. 11. N.
	—		Ceres R. A. 17 h. 44 m. dec. 20. 16. S.
	—		Jup. R. A. 4 h. 35 m. dec. 21. 37 N.
	—		Sat. R. A. 13 h. 16 m. dec. 5. 4. S.
	—		Georg. R. A. 22 h. 7 m. dec. 12. 20. S.
	—		☿ passes the mer. 1 h. 45 m.
	—		♀ passes the mer. 21 h. 25 m.
	—		♂ passes the mer. 5 h. 1 m.
	—		♃ passes the mer. 3 h. 6 m.
15			Clock before the ⊙ 0m. 8s.
	—		☽ rises 10 h. 21 m. A.
	—		☽ passes the mer. 1h. 40m. M.
	—		☽ sets 6 h. 17 m. M.
	—		Occul. (15) Scorpii, im. 9 h. 56 m., em. 10 h. 53 m.
16			Occul. θ Ophiuchi, im. 12 h. 31 m., em. 13 h. 35 m.
19	11	13	☾ in □ or last quarter.
20			Clock after the ⊙ 1 m. 3 s.
	—		☽ rises 2 h. 46 m. M.
	—		☽ passes the mer. 6h. 36m. M.
	—		☽ sets 10h. 31m. M.
	—		Occul. 35 Capricorni, im. 15h. 57m., em. 16h. 40m.
	9	33	♃'s first sat. will em.
21	17	5	♅ in conj. with the ☽ diff. of dec. 4. 40. N.
	7	58	♃'s second sat. will em.
23	12	24	♀ in conj. with the ☽ diff. of dec. 4. 15. N.
25			Clock after the ⊙ 2m. 4s.
	—		☽ rises 4 h. 29 m. M.
	—		☽ passes the mer. 10 h. 24 m. M.
	—		☽ sets 4 h. 33 m. A.
	8	52	☿ in conj. with the ☽ diff. of dec. 1. 53. N.
26	16	22	☿ greatest Hel. Lat. S.
	19	32	♂ in Aphelion.
27	9	20	Ecliptic conj. or ● new moon.
28	2	0	☾ in Apogee.
30	12	17	♃ in conj. with the ☽ diff. of dec. 0. 52. S.

Venus is a Morning Star throughout the month.

J. LEWTHWAITE, Rotherhithe.

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METEOROLOGICAL JOURNAL,

FOR FEBRUARY AND MARCH, 1835.

1835.	Thermo. Hig.	Thermo. Low.	Barometer. High.	Barometer. Low.	Rain in inches.	1835.	Thermo. Hig.	Thermo. Low.	Barometer. High.	Barometer. Low.	Rain in inches.
Feb.						March					
26	49	38	29,36	29,29	,375	12	54	43	29,74	29,71	,1
27	49	34	29,42	29,32	,425	13	54	40	29,60	29,48	,6
28	46	28	29,72	29,56	,025	14	48	39	29,35	29,26	,175
March						15	48	37	29,24	29,20	,075
1	43	27	29,74	29,28	,05	16	50	35	29,98	29,76	,2
2	43	28	30,00	29,95	,1	17	49	40	29,86	29,73	
3	46	34	29,90	29,82		18	49	39	29,99	29,85	,05
4	49	30	29,76	29,58		19	43	32	30,17	30,11	,025
5	43	26	29,50	29,40	,05	20	45	28	30,23	30,21	
6	47	37	29,44	29,34	,1	21	48	38	30,24	30,21	,125
7	45	29	29,45	29,36	,125	22	47	39	30,21	Staty.	,175
8	46	28	29,65	29,39	,275	23	47	37	30,21	30,19	,025
9	47	32	29,30	29,11		24	48	35	30,29	30,20	,025
10	51	31	29,61	29,04	,2	25	46	30	30,47	30,40	
11	51	40	29,55	29,47	,15						

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37 32 N.
Longitude 3 51 West of Greenwich.

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No. XXXVII.

Recent Patents.

To JOHN RAMSBOTTOM, *of Todmorden, in the county of Lancaster, mechanic, and* RICHARD HOLT, *of the same place, iron-founder, for their invention of certain improvements in the construction of power-looms for weaving cotton, and other fibrous materials, into cloth or other fabrics.*—[Sealed 12th July, 1834.]

THESE improvements in the construction of power looms for weaving cotton, and other fibrous materials, into cloth or other fabrics, consist in a peculiar and novel arrangement of the ordinary parts or pieces of mechanism appertaining to looms: by which arrangement the Patentees are enabled to weave two pieces of fabric at one time, through the agency of a rotary

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axle, by power derived from steam or water, or any other first mover, or by animal or manual labour.

This arrangement includes a new contrivance, by means of which the working parts of the loom are instantly stopped whenever the weft thread breaks, and also a novel apparatus, forming a pair of self-acting temples, for the purpose of keeping the work distended to the required width.

In this improved loom, instead of placing the warp threads horizontally, as in ordinary looms, they are placed vertically, in two ranges; the one range of warp threads extending from a roller or work beam below, toward a work beam at top, in front of the loom; the other range of warp threads, extending in like manner at the back of the loom; and instead of giving to the double lathe in which the reeds are mounted pendulous vibratory movements, as in ordinary looms, the lathe is made to rise and fall in perpendicular directions, and the headles or healds, by which the sheds of the warps are opened, are moved to and fro horizontally by means of a vibrating lever.

This arrangement will be clearly perceived by reference to the accompanying drawings (see Plate IV.), in which fig. 1, represents the front of the loom in geometrical elevation; fig. 2, being a similar representation of the left hand end of the loom; and fig. 3, of the reverse or right hand; and fig. 4, is a vertical section, taken transversely through the loom, near the end toward the left hand, the same letters referring to corresponding parts in all the figures: A, A, A, is the standard or frame supporting the working parts of the loom; B, B, is the crank shaft, by which the loom is driven, having a fast and loose pulley affixed at its end, with a band passing from the rotary driving power.

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The crank shaft has also fly wheels at its ends for balancing or regulating the motions: C, C, are the warp rollers, the pivots of their axles turning freely in vertical grooves in the end frames: D, D, are friction rollers, upon which the peripheries of the warp rollers bear; they receive their rotatory movement through the agency of a revolving cam *z*, on the crank shaft B. (See fig. 1.) This cam *z*, as it revolves, acts upon the end of a right-angled lever *y*, *y*, pendent from a stud or fulcrum, fixed in the cross rail of the frame; to the lower end of which lever (shown by dots) is connected a click or catch *x*, taking into the teeth of the ratchet wheel *w*. The rotation of the cam *z*, gives vibratory action to the weighted lever *y*, which causes the click *x*, at every stroke, to take up one tooth of the ratchet wheel *w*, and so progressively to draw it round.

This rotatory movement of the wheel *w*, with its axle, carries round the endless screws or worms *v*, *v*, which respectively take into the toothed wheels affixed to the axles of the friction rollers D, D, and cause those rollers to turn, and by the friction to carry round the warp rollers C, slowly, for the purpose of giving out the warp. The warp yarns thus delivered are passed under the friction rollers D, and conducted upwards toward the work beams G, G, between tension rods *u*, *u*, mounted in the spring brackets *t*, *t*, (shown in the section, fig. 4,) which springs afford elasticity to the warp when the reeds beat up the work: E, E, are the healds or headles placed horizontally, and held by tension straps attached to the vibrating rollers L, L: F, F, are the two lathes, each carrying a reed, placed horizontally; which lathes are made fast at their ends to the cross-shaped pieces H, H, H, H, which slide up and down perpendicularly between guide rollers *r*, *r*, *r*, *r*,

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mounted on studs fixed in the end standards, as shown in fig. 4.

Straps or rods I, I, attached to the cranks of the shaft B, are connected by pivot joints to the cross-shaped pieces H, H; and consequently, as the crank shaft goes round, these rods work the cross-shaped pieces with the lathes up and down in vertical directions, for the purpose of beating up the weft threads.

The headles or healds E, E, for weaving plain cloths, connected by the tension straps to the vibrating rollers L, L, are moved to and fro, for the purpose of opening the sheds of the warp, by means of a vibrating lever M, which is attached to a strap *s*, *s*, passed round pulleys fixed on the end of the rollers L, L.

This lever M, vibrates on its fulcrum pin or stud *g*, fixed in the end standard, (see fig. 3,) and is worked by a heart cam N, shown by dots, revolving within an oblong frame J, which forms the lower part of the lever M. The heart cam N, is fixed to a toothed wheel *p*, mounted upon a stud in the end frame; and rotatory motion is given to this wheel and cam by a pinion *o*, on the crank shaft, which cam, as it revolves, causes the lever M, to vibrate, and hence by its connexion with the strap *s*, to give the traverse motion to the healds: O, O, are the pecker levers, suspended upon studs fixed to the top frame; they are put in vibratory motion by the rods or cords P, P.

These rods or cords P, P, are alternately drawn down by small levers Q; each of which levers are carried by and turn upon pivots at the end of the horizontal shifting bar U. (See fig. 1.) On the inner side of these small levers Q, a friction roller *n*, is attached, and shown by dots in fig. 4; which roller, as the lathe passes up and down, is acted upon by a tappet R, formed on an in-

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clined plane, and affixed to the lower part of the cross H. As the lathes descend, the tappet R, strikes against the roller of the small lever Q, and by forcing the lever back, causes the cord or rod P, to be drawn down suddenly, and by that means a sharp stroke to be given to the pecker lever O, which is required for projecting the shuttles along the races of the double lathe, that is, over the upper surface of the horizontal reeds.

It will be understood that this contrivance is adapted to both ends of the loom, and that they are alternately brought into operation.

The shifting of the bar U, horizontally, for the purpose of bringing the levers Q, alternately into operation with the tappets R, at the opposite sides of the loom, is effected by the arm S, extending from the vibrating lever M. This arm S, carries a pin *m*, which works in a slot at the end of the lever T; (see figs. 1, and 4;) and as the lever M, vibrates, this pin *m*, raises or depresses the end of the lever T, and thereby causes its opposite end to shift the bar U, to and fro, for the purpose, before mentioned, of bringing the levers Q, alternately in the way of the tappets R, when the latter descends. The taking up of the cloth on to the work beams is effected by the levers V, V. (See fig. 3.) The upper ends of these levers are weighted at *l*, *l*, for the purpose of pressing their lower ends against the rods *k*, *k*, behind the shuttle boxes. To each of these levers is attached by a joint a click *i*, *i*, which respectively take into the teeth of the ratchet wheels *h*, *h*, turning upon studs fixed to the side standards. The levers V, V, are acted upon by the lathe as it rises and falls; the descending movement of the lathe causing the clicks *i*, *i*, to slide over the teeth of the ratchets *h*, *h*, and the ascending movement of the lathe allowing the weights

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l, l, to draw the clicks *i, i*; and thus the ratchet wheels *h, h,* are progressively drawn round, and by means of a pinion on the axis of each ratchet wheel, respectively taking into the teeth of one of the wheels *g, g,* fixed on the axles of the work rollers, the work is gradually taken up: that is, the cloth is rolled upon the beams G, G.

The contrivance for stopping the loom on the breaking of the waft thread consists of levers W, W, which we call hands with fingers. These are attached to rods X, X, extending across the loom, and turning in bearings on the side standards.

Fig. 5, is a plan or horizontal view of one of the shuttle races of the lathe, with the reed fixed therein. At each end of the reed there is an aperture in the shuttle race, covered by some slight wires *j, j,* set sufficiently apart to allow the fingers of the hand W, to fall through when not supported. If the weft thread is entire, that is, unbroken, and extending from the work to the shuttle, this thread being across these wires, and tightly distended, will sustain the weight of the hand W, and lift it when the lathe rises; but if the weft thread is broken, that support will not be afforded to the fingers W, and they will fall through.

It will be perceived that to one end of each of the rods X, X, there is affixed a small lever Y, (see figs. 1, and 2,) and this lever is connected to another lever Z. Each of these levers has a notch or stop in its edge. Now when the lathe rises, if the weft thread is entire, it will be tightly distended over the open wire *i*, and lift the fingers W, which will cause the rod X, to turn sufficiently, to throw back the levers Y, and Z, into the position shown by dots, the lathe will then ascend and descend without obstruction; and such must be the case when the loom is in effective operation. But in

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the event of one of the weft threads breaking, the fingers of the hand w, by falling through the aperture *j*, will not now turn the rod x; and the lever z, then standing forward, as in fig. 3, will present its notch or catch to the transverse bar *f*, affixed to the end of the lathe; and as the lathe rises, it will strike against the notch in the lever z, and cause the lever z, to be lifted upward, and by so moving, to raise the sliding bar *e*, which is connected to these levers z.

A pin at the lower end of the sliding bar *e*, acts against a lateral spring *d*; and when the sliding bar *e*, stands as in fig. 2, the spring *d*, is kept back in tension; but when the sliding bar *e*, is raised by the means just described, the spring *d*, is enabled to act against a small arm *c*, upon the vertical shaft *b*, mounted in socket arms, extending from the end standards.

The striking of the bar *f*, therefore, against the notch in the lever z, which will be the case whenever the weft thread breaks, lifts the sliding bar *f*, and allows the spring *d*, to act against the arm *c*, and thereby to turn the shaft *b*, which causes the strap guider attached to that shaft to shift the rigger band from the fast pulley *a*, to the loose pulley, in order that the evolutions of the loom shall instantly cease.

The back part of each shuttle box has a spring lever 3, 3, (see the horizontal view, fig. 5,) called a swell, as in other power looms; which lever, when the shuttle lies in the box, is pressed outward; but when the shuttle is not in the box, it falls inward.

A pendent catch lever 4, 4, is attached to the back of each shuttle box, as seen in fig. 2, which, when the swell 3, 3, is pressed outward, preserves the perpendicular position of the pendent catch levers 4, 4, as shown;

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but when the swell 3, falls inward, the lever 4, assumes the inclined position, shown by dots in fig. 2. The rising of the lathe now brings the end of the inclined catch lever 4, against the arm 5, extending from the sliding bar *e*, and causes that sliding bar to be lifted, which brings the nib 1, at the lower part of the bar *e*, into coincidence with the nib 2, on the fly wheel, and so stops the loom instantly, as before described.

The self-acting temples, for keeping the work or fabric distended, are formed by fixed chaps 6, 6, (see fig. 1,) attached to the transverse bar or breast beam 7, 7; and the moveable chaps 8, 8, have wire cards, or rough internal surfaces, for taking hold of the work or cloth as it is produced.

These moveable chaps are connected by rods 9, 9, to the ends of the upright arms of the bent levers 10, 10, the fulcrums of which are studs fixed in the framework. Now when the lathe ascends, the tappet pieces R, R, lift up the ends of the horizontal arms of the bent lever, 10, 10, and thereby cause the chaps to be drawn down and released from holding the cloth or fabric; and as the lathe descends, the V-shaped springs 11, 11, acting between the two upright arms of the bent levers 10, 10, force the moveable chaps outward in contact with the cloth. The springs 11, 11, keeping the moveable chaps distended, and consequently the cloth or fabric stretched to the required width.

The specification concludes by saying—" We desire it to be understood that we claim the arrangement of mechanism above described for weaving of cloths, or other fabrics, from cotton, and other fibrous materials; and we clam also the contrivances for stopping the loom when the weft threads break, or the shuttle does

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not reach its destination; and the mode of constructing and working self-acting temples, as described and shown in the drawings."—[*Inrolled in the Rolls Chapel Office, January*, 1835.]

Specification drawn by Messrs. Newton and Berry.

To JEAN BAPTISTE MOLLERAT, *now residing with Sir John Byerley, at Whitehead's Grove, in the parish of St. Luke, Chelsea, in the county of Middlesex, manufacturing chemist, for his invention of certain improvements in the manufacture of gas for illumination.*—[Sealed 25th September, 1834.]

THIS invention consists in *utilising* the vapour of certain volatile liquids which are very rich in carbon, to render luminous certain gases which are not so, though they are combustible. I employ for this purpose several volatile liquids, hereinafter named: 1st. the *very* volatile liquid obtained from the distillation of the tar produced in the manufacture of gas or coke.

The tar, distilled at a gentle heat, furnishes an oil composed of the sesquicarburet and the bicarburet of hydrogen, containing generally in 100 parts, 91.2 of carbon, and 8.8 of hydrogen. It is known that the sesquicarburet of hydrogen contains 90.02 of carbon, and 9.98 of hydrogen; and the bicarburet 92.35 of carbon, and 7.65 of hydrogen: each of these two bodies boil at 186° of Fahrenheit, and possess a very great elasticity; their density is the same, being 0.86; water being 1. at the ordinary temperature.

The liquid I employ will support a degree of cold, equal to the zero of Fahrenheit, without solidifying, which proves that it contains a sesquicarburet which

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remains liquid at that low temperature, while the bi-carburet becomes solid at the freezing point of Fahrenheit.

Coal tar, produced in the manner above stated, yields 10 to 12 per cent of the volatile oil above mentioned, proper for the use of my patent; but the first product of this distillation is the only one proper to be employed for that object, without being rectified; what comes over afterwards, is mixed with an oil that boils only at 212°, and contains, besides, napthaline, which only boils at 380° of Fahrenheit. If this second product were employed, a second distillation would be necessary to get rid of the oil and napthaline, in an apparatus, on the principle of that of Woolf. If coal were distilled for the express purpose of obtaining the volatile oil, a greater per centage than the above would be produced.

Secondly, The natural products known under the names of naptha patroleum of Malta (mineral pitch), asphaltum and bitumeus; whether these matters are found in a mixed state in sandstone, schiste or limestone, or only in a liquid state, or procured by the distillation of these mineral products.

These matters are all formed of carbon and hydrogen, but can only be employed after being rectified, so as to boil at about 212° of Fahrenheit.

Thirdly, The oil obtained by the distillation of caoutchouc, the first oil that comes over in this distillation, at the ordinary temperature, possesses a considerable illuminating power. I also employ any other oils which are very rich in carbon, and volatile enough to boil at 212° Fahrenheit.

The gas which I render luminous by the addition of any of these oils, is either pure hydrogen, or a

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mixture of hydrogen, carbonated hydrogen, and carbonic oxide.

I obtain pure hydrogen by the processes described in all treatises of chemistry, either by the decomposition of water, by means of iron or zinc and an acid, or by means of iron at an elevated temperature.

The gas which I prefer is that obtained in passing steam over red-hot charcoal reduced to a state of dust or powder, or over red-hot coke. The gas is a mixture of hydrogen, carbonic acid, carbonic oxide, and carburetted hydrogen, in variable qualities, according to the mode of operation. When the apparatus is only gently heated, there are produced hydrogen, much carbonic acid, and a small quantity of carbonic oxide; when, on the contrary, the apparatus is properly heated, and if the gas passes over a great excess of *incandescent* charcoal, before it arrives at the gasometer, it will produce hydrogen, much carbonic oxide, and little or no carbonic acid.

This gas may be produced in retorts similar to those used for making coal gas; but I prefer an apparatus consisting of one or more retorts, with a partition in the middle through the whole of the length. These retorts, filled with charcoal, are placed horizontally in a furnace, and so disposed, that the steam of water passes through the whole length of the under half of the retort, and returns through the whole length of the upper half, into a pipe leading to the gasometer. This mode is adopted, in order that the water may be forced to pass through a great excess of red-hot charcoal; and thus produce the least possible of carbonic acid, and the greatest quantity of carbonic oxide. Instead of the partition above-named, retorts may be connected together with pipes, so as to obtain the same effect. The

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retorts may also be placed vertically; in this case, receivers or vases holding charcoal should be adapted to the upper end, closing hermetically, and thus furnish a supply of charcoal to the retort as it is wanted.

When the gas is thus prepared, there is no occasion to wash it, as it will be then almost entirely composed of hydrogen and carbonic oxide, in nearly equal portions, and a certain quantity of carbonated hydrogen.

To render the gas luminous, a current from the gasometer is passed into a vessel containing one of the volatile oils mentioned above. A part of the oil is converted into vapour, and carried off by the gas; and even before the gas has taken off enough to be saturated, it has acquired a luminous quality, sufficient for the purpose of lighting. When the temperature of the atmosphere is below 60°, the vessel containing the oil must be warmed until it has attained that temperature; which may be done by a small pipe from the gasometer placed under it, and firing the gas, or by keeping the vessel in warm water, maintaining it at the temperature of 60° at least.

The vessel containing the oil ought to be so arranged, that the gas which arrives may always take up the same quantity of volatile oil, which then passes into the service pipes for use.

The volatile oil may be mixed with the gas on its passage from the retorts to the gasometer, or in the gasometer itself; but I prefer the first method as the most advantageous. One pound of charcoal will produce at least fifty cubic feet of gas, and each cubic foot of gas requires from forty to fifty grains of the oil distilled from coal tar; two pounds of water furnishes, by its decomposition, about 800 gallons of gas.

I claim as my invention, the method of decomposing

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water by charcoal, so as to be free from carbonic acid without washing, which previously was always indispensable.

I claim, also, the having ascertained, by direct experiment, the chemical and physical qualities of the volatile oil necessary for rendering water-gas luminous, and support the changes of temperature, inasmuch as they must be in the state of a sesquicarburet, and boil at a temperature inferior to that of water.

I also claim as new, the having determined the quantity of volatile oil necessary to be combined with a given quantity of water-gas, to render it highly luminous.

I likewise claim as my invention, the method of combining the volatile oils and the water-gas, as well as the temperature at which those oils should be maintained, in order to their being taken up in a sufficient quantity by the gas before it passes into the service pipes.—[*Inrolled in the Rolls Chapel Office, March,* 1835.]

Specification drawn by the Patentee.

To George Daniell Carey, *of Basford, in the county of Nottingham, hat-manufacturer, for his invention of certain machinery or apparatus to be employed in the manufacture of hats.*—[Sealed 22d October, 1834.]

This invention of certain machinery or apparatus to be employed in the manufacture of hats, consists in the adaptation of a system of rollers forming a machine, by means of which the operation of ruffing or plaiting of hats may be performed; that is, the beaver or other fur may be made to attach itself, and work into the felt

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or hat body without the necessity of the ordinary manual operations.

The accompanying drawings (see Plate V.) represent the machine in several views, for the purpose of showing the construction of all its parts. Fig. 1, is a front elevation of the machine; fig. 2, is a side elevation of the same; fig. 3, is a longitudinal section of the machine; and fig. 4, is a transverse section; the similar letters indicating the same parts in all the figures.

Upon a brick, or other suitable base, a furnace or fire-place *a*, is made, having a descending flue *b*, for the purpose of carrying away the smoke. A pan, or shallow vessel *c*, *c*, formed of lead, is placed over the furnace; which vessel is intended to contain a sour liquor, as a solution of vitriolic acid and water. On the edge of this pan is erected a wooden casing *d*, *d*, *d*, which encloses three sides, leaving the fourth open for the purpose of obtaining access to the working apparatus within. A series of what may be termed lantern rollers *e*, *e*, *e*, are mounted on axles turning in the side casings; and another series of similar lantern rollers *f*, *f*, *f*, are in like manner mounted above. These lantern rollers are made to revolve by means of bevel pinions fixed on the ends of their axles, which are turned by similar bevel wheels on the lateral shafts *g*, and *h*, driven by a winch *i*, and gear, as shown in figs. 1, and 2.

Having prepared the bodies of the hats, and laid upon their surfaces the usual coatings of beaver, or other fur, the hats so prepared are to be placed between hair cloths, and these hair cloths folded within a canvas, or other suitable wrapper. Three or more hats being thus enclosed in each wrapper, the packages are severally put into bags or pockets in an endless band

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of sackcloth, or other suitable material; which endless band is extended over the lantern rollers in the machine.

In the first instance, for the purpose of merely attaching the furs to the felts (which is called sticking, when performed by hand), I prefer to pass the endless band *k*, *k*, *k*, with the covered hat bodies, over the upper series *f*, *f*, *f*, of the lantern rollers, in order to avoid the inconvenience of disturbing the fur, which might occur from substituting them to immersion in the solution contained in the pan before the fur had become attached to the bodies.

After this operation of sticking has been effected, I distend the endless band *k*, *k*, *k*, over the lower series of lantern rollers *e*, *e*, *e*, and round a carrier roller *l*, as shown in fig. 3; and having withdrawn the hat bodies for the purpose of examining them, and changing their folds, I pack them again in a similar way in flannel, or other suitable cloths, and introduce them into the pockets or bags of the endless bands, as before.

On putting the machinery in rotary motion in the way described, the hats will be carried along through the apparatus, and submitted to the scalding solution in the pan, and also to the pressure, and to a tortuous action between the ribs of the lantern rollers as they revolve, which will cause the ends of the fur to work into the felted bodies of the hats, and by that means to permanently attach the nap to the body: an operation which, when performed by hand, is called rolling off.

Having described a convenient mode of adapting a series of rollers constituting a machine for the purpose of ruffing or plaiting of hats, I wish it to be understood that I do not propose to confine myself precisely to the form or construction of machine shown, but intend to avail myself of any variation or modification of ma-

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chinery in which a system of rollers, whether formed as lanterns, or in any other way, having openings or spaces between, or flutes, shall be applied to the said operation of ruffing or plaiting, or fixing the fur upon the bodies of hats by friction, pressure, and contorted action, the hats being enveloped in wrappers in connexion with a travelling band.—[*Inrolled ia the Inrolment Office, April,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To ROBERT STEPHENSON *the younger, late of St. Mary's Cottage, Downshire Hill, Hampstead, in the county of Middlesex, but now of Haverstock Hill, in the said county, civil engineer, for his invention of an improvement in the mode of supporting the iron rails for edge railways.*—[Sealed 11th December, 1833.]

A GREAT inconvenience having been found to arise from the chairs or supports of the rails of railroads, partially sinking by the pressure of the carriages passing over them, which causes the junctions of the rails to separate, and the rails to move out of their correct positions, several modes of supporting the ends or junctions of the rails, and of securing them firmly in their seats, have been proposed, and made the subjects of patents.

The invention to protect which the above patent is taken, is for a similar object, consisting in a peculiar mode of mounting and fixing the ends of the rails of railways.

The Patentee says, that his improvement in the mode of supporting the iron rails for edge railways, relate to the construction of the chairs or iron supports in which the iron rails for edge railways are to be seated

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and fastened, and which chairs are to be firmly bedded and spiked down upon stone blocks, or upon wooden sleepers, or cross-bearers, in the ordinary way: the particular feature of the improvement being a method of providing self-adjustable bearings at the bottoms of the notches in the chairs for the rails to rest upon.

These bearings are proposed to be made capable of self-adjustment, in order that they may adapt themselves to the positions of the rails which bear in the chairs; and there is also a mode of fastening down the rails in the chairs, and confining them laterally in the notches.

These improvements are constructed and adapted in such a way, that the self-adjusting bearings cannot be deranged, nor the holdfasts shifted by any slight inclination into which the rail may be thrown by any partial sinking of the ground on which the sleepers are embedded, nor by any elongation or contraction of the rails from variations in temperature.

The Patentee describes his invention as consisting in "the application of a self-adjusting segmental bearing piece into a suitable cell, at the lower part or bottom of the notch in each chair, in order to form a bearing surface for the end of the rail to rest upon; the segment bearing piece being in the form of a segment of a circle, and lodged with its convexity or circular arch of the segment downwards within the cell, which is of corresponding concavity, and is excavated below the usual level of the bottom of the notch in the chair; the flat side of the segment being upwards, and constituting the bearing for the ends of the rails."

Plate V., fig. 5, is a longitudinal section of one of the chairs *a*, with the ends of two rails *b*, *b*, bearing upon the segment piece *c*; fig. 6, is a transverse section

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of the same. The rails *b*, *b*, are constructed of the ordinary forms and dimensions, and are made with half-lap joints.

The segment piece *c*, shown in perspective at fig. 7, is dropped loosely into the cylindrical recess formed in the chair, and the ends of the rails are so placed, as to bear upon the upper or flat surface of the segment piece, in the way shown in figs. 5, and 6. It will be perceived that in the event of the chair sinking at one end, the segment piece *c*, will slide round in its recess, until the upper surface of the segment piece, on which the ends of the rails *b*, *b*, bear, has assumed a true horizontal position.

In order to hold the rails down in the chair, lateral pins *d*, *d*, (see fig. 6), are passed obliquely through the cheeks or sides of the chair. These pins are cylindrically formed, and may have either conical or wedge-shaped points; which points are intended to pass into recesses formed in the sides of the rails *b*, *b*, as shown in the transverse section.

The cylindrical pins, when driven home against the sides of the rails, are made fast by keys *e*, passed through the cheeks of the chair, and through a mortice hole in each pin. The keys being slightly wedge-shaped, when driven into the mortice holes force the points of the cylindrical pins firmly against the rails, and thereby cause them to be held securely in the chair; the conical points of the pins allowing of that partial sinking or movement of the chair, which has been contemplated to take place, without deranging the true horizontal position of the rails.

The Patentee considers that those chairs which are employed to support the rails in the middle or intermediate parts between the junctions, will require only

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one of the cylindrical pins in each chair, as shown in the transverse section, fig. 8, and which may be introduced horizontally through the sides of the chair, and keyed up by a wedge as before.

These intermediate chairs are designed to keep up the rails in their erect positions, but are also furnished with the sliding segment piece *c*, in order to preserve the true horizontal bearing of the rail, in the event of the chair partially sinking.

It will not be necessary to repeat all that the Patentee has said in further explanation of his object, and the construction of his improvement, as the whole of the matter detailed is comprised in the above; but it may be desirable to state the claim of novelty in the precise words in which the Patentee has expressed it, which runs as follows:—

"Having now described the nature of my said improvement, and the manner in which the same is to be performed, I, the said Robert Stephenson the younger, do hereby declare that the said invention, whereof exclusive use is granted to me by the aforesaid letters patent, consists in the mode, hereinbefore described, of supporting the iron rails for edge railways upon a segmental bearing piece, which is lodged in a suitable cell at the bottom of the notch in each chair; the rail being confined downwards on such bearing piece by the same force of keying action, which also confines the rail laterally in the chair.

"The action or pressure which produces such confinement, is applied at or very near to the centre of curvature of the said segmental bearing piece, and of the cell wherein the same is lodged, in order that the supporting and confinement of the rail may not be disturbed or relaxed by a slight tilting or inclination of

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the chair, in the direction of the length of the rails, as hereinbefore explained.

"And as to the mode hereinfore described of producing the requisite confinement of the rails in the chairs, by means of wedge-like cross keys and cylindrical pins, applied in suitable sockets through the cheeks or sides of the chairs; and by forcing the pointed extremities of those pins into oblong grooved recesses in the rails, so as to exert an oblique bearing-down action on the rails by the force of keying, which produces the lateral confinement of the rails in the manner hereinbefore described, I wish it to be understood that although the said mode of producing the requisite confinement was invented by me, yet the same was brought into use, but without my segmental bearing piece for supporting the rails, some months before the date of the said letters patent; wherefore I do not make claim to the exclusive use of the said mode, unless my segmental bearing pieces are used in concert therewith, for supporting the iron rails of edge railways."—[*Inrolled in the Inrolment Office, June,* 1834.]

To JOHN BARTON, *of Goswell-road, in the county of Middlesex, engineer, for his improvements in the construction and application of pumps and machinery for raising fluids, and other purposes.*—[Sealed 1st June, 1833.]

THE object of the Patentee is to avail himself of the rolling and pitching motion of a vessel at sea, and to apply that motion as a moving power to actuate pumps on shipboard, in order to raise the bilge water from the

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hold, instead of employing manual labour for that purpose.

The Patentee says, that his invention "consists in certain arrangements of apparatus and machinery whereby he is enabled to take advantage of any vibration which may be produced to the body, or apparatus, or vessel, in which his improvements are placed, and thereby produce to the pump or pumps a constant working action. For instance: in a ship or vessel, whether sailing or laying at anchor, there will at all times be produced more or less action to the pumps on board, when constructed and applied according to my improvements." He goes on to say, "my invention consists in so suspending or connecting a weight or weights to the piston rods of pumps, that in whatever direction an inclination may take place, such weight or weights, from their being able to act in any direction, will cause a working motion to the pumps; and it is to the giving a universal power to such weight to turn to their work, in whatever direction the inclination or oscillation may take place, which constitutes my patent improvements."

This will be understood by reference to Plate V., fig. 14, which represents in perspective four pump barrels *a, a, a, a,* placed at equal distances apart, with a ponderous weight *b,* attached to a pendant rod *c,* in the middle, the top of the pendant rod being connected by a ball and socket joint to the standard *d, d.* Near the top of the pendant rod, cross arms *e, e, e, e,* are affixed; and the piston rods *f, f, f, f,* of the pumps are severally connected by small rods *g, g, g, g,* having universal joints to the ends of the cross arms *e, e, e, e.*

It will hence be perceived that any motion of the vessel in which this apparatus is placed will cause the pendant weight *b,* to oscillate, thereby giving an undu-

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lating movement to the cross arms; and these arms raising or depressing the pistons of the pumps, to which they are attached by rods with ball and socket joints, will cause the water to be raised up the suction pipes, shown by dots, and be thence forced along the horizontal pipes *h*, *h*, and up the standard pipes *d*, *d*, to the discharging aperture *k*, at top.

The Patentee says, in conclusion, "Having now described the nature of my invention, and the manner of combining and using the same, I would have it understood that I am aware that a weighted pendulum has been already used for actuating pumps, but it has only been capable of swinging or vibrating in one direction, consequently was of no use in situations where the vibration or oscillation is continually changing its direction. I do not, therefore, lay any claim to a weighted pendulum working in such manner; but I claim the giving a universal property to turn in any required direction to a weighted pendulum actuating pumps, whereby, in whatever direction the vibration or inclination may take place, the said weighted pendulum, or other similar apparatus, may be able to turn in that direction, and work the pump or pumps. And I would here observe, that although I have only described an arrangement of four pumps, it will be evident that similar effects may be produced to one or more pumps."—[*Inrolled in the Inrolment Office, November*, 1833.]

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To John Stanley *and* John Walmsley, *of Manchester, mechanics, for their invention of certain improvements on grates or apparatus applicable to steam-engines, or other purposes, and in apparatus for feeding the same with fuel; which apparatus, conjointly or separately, may be applied to other purposes.*—[Sealed 22d October, 1834.]

This invention consists, firstly, in a peculiar mode of mounting the fire bars of a furnace, and of moving those bars simultaneously by a rocking vibratory action, for the purpose of preventing the cinders from clogging the air passages between the bars, and thereby affording at all times a sufficient supply of air to keep up a vigorous combustion of the fuel; secondly, in the adaptation of a reciprocating rotary fan, for distributing the fuel over the surface of the fire-grate of a furnace, as it falls from between the rollers of a feeding hopper; thirdly, in the employment of an apparatus formed as a steam gauge, through the agency of which the feeding of fuel to the furnace will be suspended, whenever the force of the steam within the boiler has risen above any certain determined point of pressure.

These improvements will be more fully understood by reference to the drawing hereto annexed (see Plate V.), in which fig. 9, represents a front view of the boiler and furnace of a steam-engine to which the improvements are adapted. Fig. 10, is a section taken horizontally through the bottom of the feeding hopper, immediately above the feeding rollers; and fig. 11, is a longitudinal section taken through the boiler, flues, furnace, fire-bars, and lower-box of the feeding apparatus; in which several figures the respective letters of refer-

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ence point out the same parts of the machinery: A, is the boiler; B, the furnace under the boiler; C, C, C, the flues passing from the furnace under and round the boiler; D, is the hopper, containing coal or fuel broken into small pieces, in order that it may be enabled to pass between the indented rollers E, F, and be deposited upon the feeding plate G; from whence it is intended to be projected into the furnace B, by means of a reciprocating rotary fan, hereinafter more particularly described.

The fire-bars *a, a, a,* of the furnace are placed loosely upon the lateral rails *b, b*; one of which is fixed on each side of the ash pit in the manner represented in fig. 11. One of these lateral rails is shown detached at fig. 12; and the two rails are represented edgewise and in section at fig. 13, with one of the fire-bars *a,* placed upon them. The ends of the bars *a,* are formed concave at *c, c,* for the purpose of being enabled to bear upon the tops of the cogs or teeth of the lateral rails *b,* and to vibrate thereon as upon pivots. Three of the bars are represented in fig. 3, about the middle of the furnace, so cut off in section as to show the manner in which their concave ends are mounted upon the cogs of the lateral rails *b.* From the under part of each fire-bar *a,* a small rod *d,* extends downward; and all of these rods are connected to a horizontal rod *e, e,* the outer end of which is jointed to a bell-crank lever *f,* (see fig. 11,) which bell-crank lever is connected to the driving machinery above, as will be further explained.

The apparatus for feeding or conducting the fuel from the hopper D, to the furnace A, is actuated by the following means:—A vertical shaft *g,* (see fig. 1,) mounted in suitable bearings, carries the fast and loose pulleys or riggers *h,* and *i,* over which the driving band *k,* is

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passed, leading from the steam-engine, or any other first mover. When the band *k*, embraces the fast pulley *h*, the vertical shaft *g*, is made to revolve, and a worm or endless screw *l*, at the bottom of this shaft, taking into the toothed wheel *m*, on the axle of the feeding roller E, causes that roller to turn in the throat of the hopper. A pinion *n*, fixed at the reverse end of the axle of the roller E, takes into a toothed wheel *o*, on the axle of the other feeding roller F, which, when locked to the axle by the clutch *p*, causes the roller F, to revolve also, but with a different speed to E, according to the difference of the diameters of the wheel and pinion *n*, and *o*. By the rotation of these rollers the fuel in the hopper becomes crushed as it descends, and is delivered from between the rollers on to the feeding plate G.

At the top of the vertical shaft *g*, a crank or excentric stud *q*, is fixed, from whence a crank rod *r*, extends; which rod is connected to an excentric stud in the pulley *s*, mounted on a vertical shaft *t*, supported in suitable bearings. From the pulley *s*, a cord or band is carried round the pulley *u*, fixed at the top of another vertical shaft *v*, *v*, mounted in suitable bearings; which shaft *v*, *v*, is passed perpendicularly through the fuel hopper. To the lower part of this shaft *v*, the fan *w*, *w*, is attached; which fan moves round with the shaft *v*, within the semi-circular box *x*, under the feeding rollers in front of the furnace.

By the rotation of the shaft *g*, the crank and rod *q*, and *r*, will cause the pulley *s*, to turn with a reciprocating rotary movement; and the band which connects the pulleys *s*, and *u*, together, will give to the shaft *v*, and the fan *w*, also a reciprocating rotary movement,

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but with an increased speed proportionate to the difference of the diameters of the two pulleys.

Thus it will be perceived, that when the driving strap *k*, embraces the fast pulley *h*, the feeding rollers will be made to revolve, and to deliver the fuel on to the feeding plate G; and at the same time the fan *w*, being put into a state of rapid, reciprocating, rotary movement, the particles of the fuel as they fall will, by the action of the fan *w*, be projected from the feeding plate G, into the furnace A, and by that means be distributed over the surface of the fire bars *a*, *a*, *a*.

On the end of the axle of the feeding roller F, a crank arm *y*, is affixed; from whence a rod *z*, is carried to the bell-crank lever *f*, before mentioned. By this connexion it will be seen that the rotation of the roller F, and crank *y*, will cause the rod *z*, the bell crank *f*, and rod *e*, with the bars *a*, *a*, *a*, of the grate to vibrate to and fro on their pivots or bearings, as shown by dots in fig. 3; which will sufficiently disturb the fuel to prevent the cinders, in a great measure, from forming themselves into clinkers, and also cause the dust and other dross to fall through between the bars into the ash pit below, and thereby keep the spaces between the bars open for the free passage of air to support the combustion.

In order to regulate the intensity of the fire in the furnace, we have contrived a means of suspending the movements of the feeding roller and projecting fan, whenever any extraordinary heat shall have raised the steam within the boiler above that degree of pressure required. This is effected by an apparatus, which is a sort of steam gauge, consisting of a syphon tube H, bent into any desired number of contortions, and filled

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with water. One end of this tube is immersed into the water in the boiler, and the reverse end, or outer extremity of the syphon tube, is formed into an open chamber, in which a float I, is suspended. To this float is attached a cord or chain, passed over a pulley, and at the lower or reverse end of this chain or cord, the guider K, of the driving strap *k*, is attached. By means of this apparatus, whenever the intensity of the fire has raised the steam within the boiler above the required pressure, the force of the steam acting upon the water in the syphon will cause the float I, to ascend, and consequently the strap guider K, to be depressed: which movement of the strap guider will shift the strap from the fast pulley *h*, to the loose pulley *i*, when the movements of the feeding apparatus will cease, and no more fuel will be fed in until the pressure of the steam within the boiler is sufficiently reduced by the lowered condition of the fire, to allow the float I, in the syphon tube to descend, which will raise the guider K, and pass the driving strap *k*, from the loose pulley *i*, to the fast pulley *h*, when the feeding apparatus will be again set in motion, and continue supplying the furnace with fuel until the driving strap shall be again shifted.

Having now described the construction of our improved apparatus connected with the boiler and furnace of a steam boiler, we desire it to be understood that the same, or parts of the same, either conjointly or separately, may be adapted to other situations for feeding fuel, keeping up combustion, and regulating the intensity of furnaces; and that though some of the parts exhibited in the drawings, and described, are not new, and form no feature of our invention apart from their combination and adaptation, yet, when so com-

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bined and applied, whether by the same arrangement, or any modification to effect the same object, we claim them as constituting the subject of our invention.

And, lastly, we wish it to be understood that we claim, first, the rocking vibrating movement of the fire bars, whether mounted on pivots, or as shown in the drawing, and whether moved by machinery or by hand, and whether placed transversely in the furnace or longitudinally; secondly, we claim the reciprocating rotary fan for projecting the fuel into the furnace, actuated by any convenient power; and, thirdly, we claim the adaptation of the syphon tube and float for the purposes of stopping the feeding of the fuel, and putting the feeding apparatus in operation, dependent upon the varying pressure of the steam within the boiler.—[*Inrolled in the Rolls Chapel Office, April,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To MALCOLM M'GREGOR, *of Manchester, in the county of Lancaster, manufacturer, for his invention of certain improvements in machinery for slubbing, roving spinning, twisting, and doubling cotton, and other fibrous materials.*—[Sealed 20th October, 1834.]

THIS invention is a peculiar mode of constructing, combining, and mounting the spindle and its appendages, for roving, spinning, and doubling the fibres of cotton, and other materials, in a throstle frame, or other roving or doubling machine.

The particular object of this improvement is to give steadiness to spindles of very slender forms, by the adaptation of stationary tubes embracing the spindles;

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which tubes are designed to prevent the vibratory action of the spindles, when revolving with very great speed; and also, by the lightness of the spindles, to enable them to be driven by an inferior power to that which would be required to perform the same work by any of the ordinary constructions of roving, spinning, or doubling machinery.

In the accompanying drawing (see Plate V.), fig. 15, represents a spindle *a, a,* having a flier *b, b,* fixed on its upper end; the bobbin tubes, rails, and other appendages being shown in section.

The spindle is supported by the bottom rail *c,* without the necessity of a step, and by the tube *d, d,* which embraces the spindle, and extends nearly to its top; and is made fast to the stationary or bolster rail *e,* by the collar *f,* which is sunk into the bolster rail, and is secured by a screw nut *g,* the spindle passing vertically through the tube; and as the spindle revolves, it is kept steady, and relieved from friction, by means of bushes inserted into the upper and lower ends of the tube.

Upon the lower part of the spindle the warve *h,* is fixed, by which the spindle is driven, through the agency of a band from a cylinder, roller, or barrel, as usual. The bobbin *i, i,* fits loosely on the stationary tube *d,* and is supported by the copping rail *k.*

The copping rail is intended to traverse, that is, to be raised and depressed in the machine by any of the ordinary modes, for the purpose of traversing the bobbin up and down upon the stationary tube, as upon a common spindle.

A slight variation in the mode of mounting the spindle and bobbin is shown in fig. 16, to which the principal part of the foregoing description will apply;

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a, a, is the spindle; and it will be perceived that in this modification of the invention, the stationary tube *d,* which steadies the spindle, is something shorter than in the former figure: the spindle passing through the fast tube as before, and on the neck of the spindle above the top of the tube *d,* a collar *l,* is screwed. This collar is about half an inch deep, made something larger than the external diameter of the fixed tube *d,* and is slightly conical.

A cylindrical shell or tube *m, m,* having a rim *n,* at its bottom, is passed over the stationary tube *d,* and mounted on the top of the spindle *a*; the upper part or shoulder of the shell, bearing upon the collar *l,* and the rim *n,* at bottom falling into a circular groove, made in the collar *f,* of the fast tube. The bobbin *i,* is now placed loosely on the shell *m,* as on a common spindle; and the flyer *b,* being screwed down on the top of the spindle, the shell *m,* is by that means pressed tightly against the collar *l,* and firmly attached to the spindle, of which it must now be considered to have become a part; acting like a common spindle as they revolve together, and without rubbing against the surface of the fixed tube *d,* which tube is intended to operate, as before described, (viz.) to give stability, and to prevent the spindle vibrating when revolving with very great rapidity.

The application of these improvements enables roving, spinning, and doubling frames to produce from the lowest to the highest numbers or counts of yarn: an effect hitherto deemed impracticable in frames of the common construction; and which is obtained with the advantage of a great reduction of friction, perfect steadiness, and extraordinary celerity of motion, producing double quantities in the same hours of

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labour, and even more in proportion to the fineness of the numbers and quality of the material, with also a great saving of waste in relation to the quantities produced.

For the coarser numbers of yarn, the first described construction acts remarkably well, on account of its affording an increased tension or drag when required, which may be varied at pleasure, by increasing or diminishing the area of the under surface of the bobbin bearing upon the copping rail.

For finer numbers the modification described in the second construction is more particularly applicable, the friction of the bobbin being greatly relieved by the rotary motion of the shell or tube in connexion with the spindle, which, however rapidly driven, is prevented from vibrating, by the stationary tube round which it revolves.—[*Inrolled in the Rolls Chapel Office, April,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To Richard Witty, *of Hanley, in the county of Stafford, civil engineer, for his invention of an improvement or improvements in saving fuel and burning smoke, applicable to furnaces and stoves.*—[Sealed 25th Sept., 1834.]

This invention of an improvement or improvements in saving fuel and burning smoke, applicable to furnaces and stoves, consists in the adaptation of certain earthen tubes to the flue of the furnace of a boiler or stove, for the purpose of intercepting the smoke and other vapours before they reach the chimney, in order to effect a more complete combustion of the fuel, and

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of the sooty and inflammable matters arising therefrom, which will cause a considerable increased intensity of the heat, and consequently an economization in the quantity of fuel required to be consumed.

One mode which I have found eligible in adapting these earthen tubes to the furnace of a steam-boiler is shown in the accompanying drawings, (see Plate VI.) fig. 1, being a longitudinal section of the boiler, its furnace, and flues; and fig. 2, a transverse section of the same: A, is the furnace; B, the bridge of the furnace; C, the flue carried round the boiler in the ordinary way; D, represents a number of open tubes placed longitudinally one upon another on the bridge of the furnace, in directions leading from the furnace to the flue.

These tubes I make of Stourbridge fire clay, or they may be made of some of the known compounds of plombago, pumice stone, and other materials which are least liable to become vitrified by heat. I prefer these tubes to be of cylindrical forms, but do not intend to confine myself either to that shape, or to any particular dimensions; from nine inches to twenty-four inches in length, and from half an inch to three inches internal diameter, I have found to answer the purpose: the longer the tube, of course the larger should be its bore; and the clay, or other material, may be from one quarter of an inch to an inch in thickness.

The space between the bridge *b*, and the under part of the boiler, should be nearly, if not quite, filled up by the tubes *d*, placed one upon another; the draft from the furnace to the chimney must therefore pass through and between these tubes, which will, by that means, soon become red-hot. The soot and inflammable gases evolved from the furnace, being by the draft of the chimney brought in contact with the heated surfaces of

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these tubes, the combustible parts will be immediately consumed, and nothing allowed to pass off into the chimney but the mere vapour.

As the method of moulding the fire clay, and other material, into tubes, and the subsequent drying and baking of them for use, is well understood, and forms no part of my invention, I do not consider it necessary to explain that process; but in conclusion desire it to be understood, that I claim as my invention, the placing of tubes, or forming of narrow or contracted channels, of whatever shape, of fire-brick, or other suitable material, between the furnace and the chimney of a boiler or stove, or other heating apparatus, for the purpose of intercepting the progress of the smoke, and other combustible matters, in order that, by the intense heat of their surfaces, the soot and inflammable materials evolved from the furnace may become consumed, and a saving of fuel be thereby effected.—[*Inrolled in the Inrolment Office, April,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To James Noble, *of Halifax, in the West Riding of the county of York, worsted spinner, for his invention of certain improvements in combing wool.*—[Sealed 20th February, 1834.*]

This invention is described as consisting of "a new mechanical combination into a machine of well-known parts."

* It appears that no public notice of the grant of this patent issued from the Great Seal Office. How this omission occurred is not explained. Ought not the *London Gazette* to publish the patents for inventions, as well as grants of patents for titles?

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The machine shown in the drawing, which accompanies the specification, is a geometrical elevation taken at its side: we have, however, from our own knowledge of the machine, given it partly in section in Plate VI., at fig. 3, for the purpose of exhibiting its internal parts more clearly than they are shown in the original drawing. The framework *a, a,* supports the axle of a wheel *b, b,* in suitable bearings on each side. To the face of this wheel is affixed the excentric or heart wheel cam *c, c.* On the upper part of the periphery of this cam or heart wheel, a lever *d, d,* bears merely by its gravity, one end of which lever is connected by a joint to the crank *e.*

By the rotation of the crank *e,* it will be perceived that the lever *d,* will be slidden to and fro on the upper part of the periphery of the excentric or heart wheel cam *c,* the outer end of the lever *d,* carrying the upper or working comb or needle points *f,* as it moves performing an elliptical curve, which curve will be dependent upon the position of the heart wheel cam *c,* that guides it.

A moveable frame *g,* carries a series of points *h,* which are to constitute the lower comb or frame of needles. Into these lower needles the rough uncombed wool is to be fed by hand, and to be drawn out and combed straight by the movements of the upper or working comb.

As it is important, in order to prevent waste, that the ends of the wool should be first combed out, and that the needle points should be made to penetrate the wool progressively, the moveable frame *g,* is in the first instance placed as far back as possible; and the action of the lever *d,* during the whole operation, is so directed by the varying positions of the cam wheel, as to allow

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the upper comb to enter at first a very little way only into the wool; but as the operation of combing goes on, the frame with the lower combs is made to advance gradually, and the relative positions of the revolving heart cam wheel *c*, being also gradually changed, the upper or working needles are at length allowed to be drawn completely through the wool, for the purpose of combing out straight the whole length of its fibre.

In order to give to the machine the necessary movements, a train of toothed wheels and pinions are mounted mostly on studs, attached to the side of the frame; which train of wheels and pinions are shown by dots in the figure, to avoid confusion. The driving power, as of a steam-engine, is communicated by a band to a rigger on the short axle *i*; which axle carries a pinion, taking into one of the wheels of the train. From this wheel, the crank *e*, that works the lever *d*, is driven; and also by gear from the same pinion, the axle of the wheel *b*, carrying the excentric or heart wheel cam, is also actuated, but slower than the crank axle.

At the end of the axle of the wheel *b*, and cam *c*, a bevel pinion is affixed, which gears into a corresponding bevel pinion on the end of the lateral shaft *k*. The reverse end of this shaft has a worm or endless screw *l*, taking into a toothed wheel *m*; and this last-mentioned toothed wheel gears into a rack at the under part of the frame *g*.

It will hence be perceived, that by the movements of the train of wheels, a slow motion is given to the frame *g*, by which the lower needles, carrying the wool, are progressively advanced, as the operation goes on; and also that by the other wheels of the train, the heart wheel cam is made to rotate for the purpose, giving those varying directions to the stroke of the lever which

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slides upon its periphery and to the working comb, as shall cause the comb to operate gradually upon the wool as it is brought forward.

The construction of the frames which hold the needles, and the manner of fixing them in the machine, present no features of importance, we, therefore, think it unnecessary further to describe them; but must observe, that the heckles are to be heated when used for combing wool.

The Patentee says, that instead of introducing the wool to be combed into the lower needles by hand, he sometimes feeds it in by means of an endless feeding cloth, as shown in fig. 4. This endless cloth is distended over two rollers, which are made to revolve, for the purpose of carrying the cloth with the wool forward, by means of the endless screw and pinions.

A slight variation in the machine is shown at fig. 5, for the purpose of combing wool of long fibre, which differs from the former only in placing the combs or needle points upon a revolving cylinder or shaft. At the end of the axle of this shaft there is a toothed wheel, which is actuated by an endless sercw upon a lateral shaft.

The axle of the cylinder on which the needles are fixed is mounted in a moveable frame or carriage, in order that the points of the needles may, in the first instance, be brought to act upon the ends of the wool only, and ultimately be so advanced as to enable the whole length of the fibres to be drawn through.

The progressive advancement of this carriage with the needle cylinder is effected by the agency of the endless screw on the lateral shaft before mentioned. This variation in the machine must be so obvious, that any further description is unnecessary.

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The Patentee says, in conclusion, having thus described the nature of my invention, and the manner of combining and using the same, I would observe, that I lay no claim to any of the parts separately of which the machine is composed, they being separately well known and in use. I am aware that combing of wool has been performed by hand, and otherwise, by means of two sets of combs, similar to those shown and described; I do not, therefore, claim this part of the machinery as new, my claim of invention relating only to the construction of a machine for working the same, as above described.

And I further declare, that I confine my invention to the combination of the following parts, into a machine for working the combs or needles in combing wool; that is to say, the combining, in the manner above described, the crank, the lever, and the excentric, together with the wheel-work for actuating the same when used, for the purpose of working combs, as above described, for combing wool.—[*Inrolled in the Inrolment Office, August,* 1834.]

In the year 1817, Mr. Bundy, then of Camden-town, obtained a patent for machinery for breaking and preparing flax and hemp, part of which machinery was for combing or heckling the flax. In this machinery flax was appended to the end of a long arm or lever, and brought progressively into the heckle points or needles by a sort of whipping action, produced by an excentric or heart wheel cam, which guided the holding arm on the same principle as that above described. As it is generally considered that machinery for combing wool will apply to heckling flax, we do not exactly see what the present Patentee has to claim as new beyond form of arrangement.—Editor.

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To George Washington Wilds, *of Coleman-street, in the city of London, merchant, for his invention of certain improved machinery for cutting marble and other stones, and cutting or forming mouldings in grooves thereon.*—[Sealed 15th April, 1833.]

The machine exhibited in the drawing which accompanies this specification, consists of a series of circular cutters for separating slabs from a block of marble, or other stone; which cutters are put in rapid rotary motion by a band from any first mover (as a steam-engine or water-wheel), passed round riggers on their axles.

The block of stone is slowly advanced to meet the cutter, by the progressive movement of a platform on wheels, or a carriage on which the block of stone is fixed: this carriage being moved onward by the agency of a rack and pinion.

Plate VI., fig. 14, represents this apparatus in perspective. It is formed by a frame of wooden rails, and posts *a, a, a, a*, in which the axle of the rotary cutter *b*, is mounted. Two edge rails *c, c,* are fixed horizontally to the upright posts, for the purpose of receiving the running wheels of the platform or carriage *d*, on which the block of stone *e*, is placed. This carriage has a rack fixed longitudinally in any convenient part of its under surface, and a pinion on the lower transverse shaft *f*, drives an endless screw or worm, which takes into this rack for the purpose of moving the carriage slowly forward, in order that the block of stone may be brought up to meet the cutters.

The Patentee describes the cutters as improved revolving, circular metallic plates, smooth and without teeth upon the face or edge, operating by friction with sand and water upon the material to be cut.

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It is of course known, that in sawing stone the thin blade or instrument by which the stone is to be severed is not in fact a saw, but a soft material, as copper or soft iron, and that to the edge of this soft material the particles of sand, which are really the cutters, attach themselves, and are carried forward, in order to cut by the friction produced between the sand and the stone, merely by the motion of the cutters. In order, therefore, to cut the stone, sand and water must be applied continually to the edges of the cutter. This is done by means of a trough *g*, placed transversely above the cutters with spouts, from which the sand and water is continually running on to the stone, the several spouts being situate as nearly as possible over the edge of each cutter, as without this continual and uniform supply of sand and water to all the cutters, some of them would not be found to perform the operation so readily as others.

When several circular cutters are employed on the same shaft, they are secured, at the proper distances apart, by washers of such sizes as the thicknesses of the several slabs may require.

In this part of the invention the improvement claimed is stated to "consist in the sawing of marble, or other stone, by means of a revolving circular metallic plate, smooth or not serrated on the face or edge, and applied with sand and water, as is done with the straight saws."

The proper speeds of the cutters must vary according to their diameters; those of about two feet should move at three hundred revolutions per minute, and so on down to one hundred and fifty for a cutter of four feet diameter.

The other parts of the invention are described as

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consisting in the moulding or grooving, and polishing of marble, or other stones, by means of the improved revolving, moulding, and polishing cylinder or wheel, operating in cutting mouldings by friction with sand and water upon the surface to be wrought; and polishing by friction, in like manner, with putty, buff, pumice stone, or some other suitable material.

These improved moulding and polishing cylinders, or wheels, are to be of soft metal, or of wood. No figure of them is shown in the specification, but they are thus described:—Cast iron wheels are preferred for moulding, and some of the softer metals or wood for polishing. They may be of any dimensions suited to the work, having the converse of the intended moulding or grooving either cast or turned upon their surface or periphery; and by means of these, any series of mouldings or groovings may be wrought on a surface of marble or stone at one operation, and, in like manner, be polished.

The wheel or cylinder is placed on a horizontal shaft, which is turned by a cog-wheel, or pulley and band, connecting it to the driving power; and it is intended to operate upon the material to be wrought, by revolving vertically against its surface with sand and water for cutting mouldings, and with pumice stone, buff, or other suitable material, in polishing.

The speed of the moulding wheels may be greater than that of the saws nearly twofold, and the polishing wheels may be made to run at a greater speed than the moulding wheels. For polishing flat surfaces, a cylinder may be employed in like manner, the stone being carried forward in the way described, in reference to the sawing machine.

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The improvement claimed in moulding and polishing is, in applying a rotary wheel or cylinder to that purpose, in connexion with the other parts of the machine.—[*Inrolled in the Inrolment Office, October*, 1833.]

To JOHN HOWARD KYAN, *of Upper Baker-street, in the county of Middlesex, Esq., for a new combination of machinery to be applied to the purposes of steam-navigation, in aid of, and in substitution for, the motive power, hitherto and at present obtained and afforded by the application of steam.*—[Sealed 21st December, 1833.]

WE scarcely know how to identify the invention exhibited in this specification, with the title of the patent to which it refers. There is no auxiliary motive power described, the sole impelling power being that of steam, which is employed to work two horizontal pumps for the purpose of drawing water at the bow of the vessel into two horizontal pipes, and expelling that water from the pipes at the stern of the vessel, for the purpose of propelling the vessel by the recoil of the water so ejected.

Plate VI., fig. 6, is a plan or horizontal view of a vessel with the apparatus placed therein: *a, a,* are two openings in the bow of the vessel through which the water flows into horizontal pipes leading to the pumps. These pumps lie horizontally, and are shown in section, at *b, b*; in the figure, the pistons or plungers *c, c,* working to and fro within.

To each of the plungers of the pumps a rod is affixed, which rods respectively pass through the hori-

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zontal cylinders *d, d,* of a high-pressure steam-engine; and upon these rods, within each cylinder, is fixed the working piston, intended to be actuated by steam, as in other high-pressure steam-engines.

The extremity of each piston rod is connected by jointed arms to the ends of a vibrating beam *e, e,* and high-pressure steam being admitted in the ordinary way, through valves into the cylinders, the pistons are put in action, and consequently the pumps also.

By these means the water is drawn into the barrels of the pumps *b, b,* through the trumpet-mouthed pipes *a, a*; and by the natural operation of the lateral valves at the ends of the pump barrels, the reciprocating actions of the plungers *c, c,* cause the water so drawn in, to be forced along the horizontal pipes *f, f,* and to be ejected with considerable force, through contracted apertures *g, g,* at the stern of the vessel.

As the stream so ejected from the pipes at the stern, by striking against the water in which the vessel floats, will produce a recoil, it is expected that the vessel will in consequence be propelled forward, or in the opposite direction; and in order that this force should operate uniformly, air-vessels are connected to the pipes at *h, h,* which operate as regulators to the varying forces exerted by the plungers as they reciprocate.

The Patentee claims the particular arrangement or combination of the machinery above described, which we presume means the precise form set out; for as to the principle intended to be applied, and the manner of applying that principle, as well as the means employed for putting it into operation, they have been repeatedly proposed in various shapes, and made the subjects of several patents; we need only refer to Lilly and Fraser's patents, dated 19th August, 1820, which ap-

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pears to be precisely the same in every particular, except form. (See the London Journal of Arts, First Series, vol. ii. p. 101, and Plate V.)—[*Inrolled in the Inrolment Office, June,* 1834.]

To William Losh, *of Bruton House, in the county of Northumberland, Esq., for his having invented certain improvements in the construction of wheels for carriages to be used on railways.*—[Sealed 31st August, 1830.]

The Patentee proposes to construct the wheels of railway carriages principally of wrought iron, and suggests several modes of making them in a manner that he conceives will afford greater strength and firmness than is found in any construction of wheels heretofore made.

In the first mode proposed, bars of iron, of suitable lengths, are to be provided for the spokes, each bar being turned over at the end in a right angle, and bent in the form of a curve, corresponding with the circular form of the felly or rim of the wheel; and the reverse end of the bar is inserted into the nave of the wheel by a dovetailed joint.

Plate VI., fig. 7, shows several of these bent arms, *a, a,* connected and attached to the nave or box *b,* of a wheel, and to the rim or felly *c.* Fig. 8, is a transverse section of the wheel, in which the manner of inserting the dovetailed end of the spoke into the nave is shown.

It is proposed, in constructing a wheel of this description, first, to prepare the spokes by turning their ends over in the curved and angular shape described, and to form their inner ends with indentations or dovetails; then to place the proper number of these spokes in radial order in a founder's mould of sand or loom, and

with fluid metal, to cast the nave or box of the wheel round the ends of the spokes, so as to confine and fix the nave and spokes securely together. The rim or felly of the wheel is then to be prepared by rolling and welding to its true circular figure; and while in its hot state from the forge, the nave and the spokes are to be placed within the rim, in order to allow the rim, as it cools, to shrink tight on to the ends of the spokes, and thereby to become firmly attached.

The tire or outer rim of the wheel may be prepared in like manner by rolling with a flange or bead on the side, and which, after being welded at the joint in the form of a hoop, may be also attached in a heated state, and allowed to shrink tight to the felly. In order to give additional strength to the nave or box of the wheel, and prevent it from splitting by any strain from the spokes, rings of wrought iron are to be heated and shrunk on to the naves, as shown at *e*, *e*, in the figures 7 and 8.

A variation in the form of the arms, as shown at fig. 9, is proposed, having a sort of crutch head. The lower end of these arms are to be cast into the nave, as described above, and the crutch heads are to be fitted into small recesses in the inner part of the rim or felly, which, in a heated state, is to be shrunk on as before.

A mode of attaching the tire is shown at fig. 10; which consists in hollowing the periphery of the felly, and forming the inner part of the tire by rolling to such a shape as shall correspond with the hollow, and cause the tire to attach itself firmly to the felly when shrunk on.

Two other modes of forming the spokes of wheels for railroad carriages are shown at figs. 11, and 12; which consist in bending the bars into a double arm,

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either parallel or at an angle; the mode of attaching them to the nave and to the felly will be obvious.

For the wheels of carriages intended to run upon flat rails, or surface plates, the edge of the felly may be made sharp, or with an acute angle, as shown in the section, fig. 13.

The various constructions of wheels are proposed by the Patentee as more firm and durable than any wheels heretofore used, and which he believes entirely new, and never made or used by any other person or persons.—[*Inrolled in the Inrolment Office, February,* 1831.]

To THOMAS EDMONDS, *of Burton-street, in the parish of St. George, Hanover-square, in the county of Middlesex, for his invention of a certain process or method of manipulation and treatment for the preparation of leather, whereby it becomes less pervious to water, and preserves better its pliability during use, than does leather prepared by the ordinary means.*—[Sealed 22d May, 1834.]

THE Patentee says, I subject leather as it has been previously prepared by tanning or tawing, to the processes and treatment as hereinafter set forth.

For the first operation, I dissolve in three gallons of water, alum four pounds, gum arabic, gum trajacanth, of each two ounces. Apply this solution, at nearly boiling heat, with a sponge or soft cloth to both sides of the leather, in either a tanned or tawed state. Whilst the leather is still soft and damp, it must be pressed for a few hours betwixt hard and smooth surfaces; the degree of pressure being made greater or less, according to the substance, kind, and quality of

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the skin or hide: such continued pressure may be made betwixt plates of glass or polished metal, or betwixt slabs of marble, the pressure being effected by means of weights or screws. When removed from this kind of pressure, the leather should be passed repeatedly through a rolling machine; one of the cylinders of which should be heated by steam, or other well-known means, and the other kept cool: the degree of pressure betwixt the cylinders should be adjustable by means of screws, cams, levers, or wedges, so as to accommodate it to the thickness of the skin; this will give firmness or closeness to the leather.

For the second operation: liquefy by heat, of hog's-lard and deer suet, each four pounds, and melt together also by the aid of heat, of the cleanest resin, white bees-wax, and Burgundy pitch, each one pound and a half, in one pint of pale sperm oil: mix the two quantities of liquefied matters together whilst hot, and strain the whole through a fine sieve, adding, at intervals, whilst it is passing through the sieve, one pint of spirits of turpentine, and subsequently, half a pint of spirits of wine; then simmer the whole together gently, and apply it ina warm state by means of a brush or mass of fine cloth to the dressed side of the leather, until the surface is well covered. Whilst the leather is still moist, pass it through rollers as before, until it becomes quite dry. For black leather, mix together two ounces of nitrate of silver, and four ounces of Prussian blue, each pulverized, and four ounces of lamp-black; add these ingredients to the composition of resinous and unctuous matters, before passing it through the sieve. If the leather is intended to be of any other colours, suitable pigments or colouring matters, in place of the above, must be employed.

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For the third operation, triturate together burnt alum, chalk, or pipe-clay, and steel filings, of each four ounces, and pass the powder through a very fine sieve, with a flattened face of a piece of pumice stone, or other porous material: rub some of the above powder on the dressed side of the leather, the skin being laid upon a slab of marble, or plank of smooth hard wood; the rubbing being continued until the surface becomes clear and polished.

Lastly, mix a portion of such colouring matter as corresponds with the colour of the leather in preparation, with a solution of white wax, in spirits of turpentine, and brush some of this in a liquid state slightly over the face of the leather; and, again, pass it through the rollers, or betwixt the pressing plates, and then the process will be completed.—[*Inrolled in the Inrolment Office, November,* 1834.]

List of Patents

Granted by the French Government from the 1*st of July to the* 30*th of September,* 1834.

PATENTS FOR FIFTEEN YEARS.

To John Houldsworth, of Manchester, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, 4, Rue Choiseul, for improvements in spinning-machines.

— Louis Michel Bazin, of St. Malo, represented in Paris by Mr. Perpigna, for certain improvements in pulleys.

— Arnaud and Flanard, of Lyons, represented in Paris by Mr. Perpigna, for improvements in the Jacquart frame.

— Jean Baptiste Francois Beaudemoulin, for a new system of making bread.

— Eugène Maire, of Havre, for a new method of preserving ships from foundering at sea.

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To Esteve and Barrailley, of Lormont, near Bordeaux, represented in Paris by Mr. Perpigna, for a carriage or dray to drag ashore, or on a railway, ships or other vessels when wanting repairs.

— Michel de St. Albin, represented in Paris by Mr. Perpigna, for an improved apparatus for reducing into pulp the rags and other substances used in paper-making.

— Francois Berjou, for a new horse-shoe.

— Pierre Foissac, for a new motive power.

— Francois Michel Havard, for an improved water-closet.

— Henri Walker Wood, for a chemical process for making carbonate of lead.

— Charles Alexandre Stigers, for an improved coach.

— Pierre Joseph Mozard, for an improved kind of paper which prevents forgeries.

— Frederick Sauvage, for an instrument called *physionotype*, used for taking moulds or casts from nature.

— Adrien Dominique Cabarus, for a new motive power.

— Louis Alesis Boillot, for a chemical process for bleaching wax.

— Joshua Taylor Beale, of London, for a lamp applicable to the combustion of matters not hitherto used for illumination.

PATENTS FOR TEN YEARS.

— Anacharsis Meniers, of Bordeaux, represented in Paris by Mr. Perpigna, for a new method of deriving a motive power from a running stream.

— Francois Gabet, of Rome, represented in Paris by Mr. Perpigna, for certain improvements applicable to locomotive carriages.

— Andre Kœchlin, of Mulhausen, for an expansive steam-engine.

— Pierre Hilaire Galibert, for an improved lamp.

— Alexandre Darlu, for an improved lamp on the Torricellian principle.

— Godard, of Baccarat, for certain improvements in making crystal.

— Gilbert Brewster, civil-engineer, for an improved gas-meter.

— Drouault, brothers, for an improved method of taking in and letting out reefs in sails of vessels.

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To Etienne Eulriot, for improvements in pianos.

— Doguet, father and son, for an improved method of making ribbons without false strokes.

— Jean Baptiste Questa, for a certain improved machinery set in motion by the muscular force of man, and producing a motive power.

— Francois Théodore de Bari, for an artificial paving stone.

— Anatole Henri Gerdret, for an apparatus for preserving horses from losing their wind.

— Frederic Danchell, for an improved piano.

— William Godefroy Kneller, for an improved apparatus for the evaporation of liquors.

— Tallon Ashley, of Pont-audemer, for an improved method of writing.

— Jean Joseph Pouydebat, for a new machine called by him a reaping machine.

— the Count de Mauny, for dynamic cylinders.

— Charles Chevalier, for a new kind of telescope.

— Benjamin Weston Wells, of London, for a method of rendering sea water soft and potable.

— Jean Desiré Guilmard, for improved shutters for shop windows.

— Felix Francois Tierce, of Rouen, for a machine for preparing cotton and other fibrous substances.

— Antoine Dida, for improvements in saucepans, fryingpans, and other culinary utensils.

— Caïman-Duverger, for an improved spinning-wheel.

— Antoine Ruffy, of Nice, for an olive-mill.

— Talabot, brothers, for an apparatus applicable to the immediate dessication of porcelain earth and pipe-clay.

— Pierre Alexandre Lemare, for an improved kind of oven.

— Pierre Gabriel, for a new method of lighting up towns and villages.

PATENTS FOR FIVE YEARS.

— William Keene, civil-engineer, of Bordeaux, represented in Paris by Mr. Perpigna, for an improved float for buoying up boats in rivers and canals.

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To Jean Charles Etard, for an improved packing box.

— Jean Pierre Payan-Mariotte, for improvements in the cushions of billiard tables.

— Pierre Nicolas Hainsselain, for a new motive power to be used in place of steam.

— Jacques Wansbrough, of Paris, for improvements in the making of silk hats.

— Victor Delœuvre, for an improved hand-mill.

— Charles Dien, for a new stand or bearing to be used in the mounting of globes.

— Antoine Gibus, for a new kind of hat.

— Pierre Joseph Mozard, for an improved kind of ink.

— Jean Joseph Delporte, for a razor with a moveable ring.

— Xavier Adrien Martin, for a system of machinery to be used in extracting the juice from beet-root.

— Etienne-prosper Duroure, for improvements in the frame used for making ribbons.

— Antoine Dida, for a new kind of spitting-box.

— Louis Zéphirien Gugnon, of Metz, for a continuous distilling apparatus.

— Banon and Saron, brothers, for an economical stove.

— Benoit Jean, for an improved oven for calcining plaster of Paris.

— Joseph Moifred, for improvements in brass wind instruments.

— Antoine Lafarque, for a pen supplying itself with ink.

— Pierre Brissac, of Lyons, for a machine for carding wool or horse-hair mattresses.

— Francois Tomassin, for a new system of roads to be used in lieu of railroads.

— Hervier Gauthier and Co., braid-manufacturers, for improvements in the braid frame.

— Francois Claude Biette, for improved heads or caps for chimneys.

— Bernard Montfallet, of Bordeaux, for an improved flooring for apartments.

— Pierre Lebriat, of Perigueux, for improvements in shoes and boots.

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To Descombes, Savoye, Tortel, and Peysson, for an improved machine for making milled stockings.

— Louis Jules Sellier, for improvements in cartridge boxes.

— Eleonor Fréderic Godefroy, for an improved kind of spring.

— Jean Baptiste Malizard, for an improved zinc covering for houses.

— Adrien Baudry, for a liquorice paste called by him *pectoral balsamic paste.*

— Louis Rey, for a new kind of moorings for ships or other vessels.

— Reymond Bertant, for an improved watch, winding itself up without a key.

— Joseph Tapie, for a new kind of chocolate prepared with Iceland moss.

— Charles Lan and Co., for an apparatus called *moderator,* and used for moderating the flame of gas.

— Grillet and Trotton, for an improved method of manufacturing shawls.

— Marc Antoine Rolland, for an improved kind of wig.

— Nicolas Frederic Charroy, for a new kind of fireworks called *alaram fireworks.*

— Dupuis and Leroux, for a new method of singeing silk and woollen tissues.

— Floride Amedée Legavrian, for an improved method of extracting the juice of beet-root.

— Breton, father and son, for a new kind of sieve used for cleansing the pulp in paper manufactories.

— Louis Thomas, for an improved apparatus used for introducing hot air in furnaces.

— Pierre Francois Etienne, for an improved drawing board.

— Charles Antoine Bruyer, for improved ledgers and account books.

— Pierre Turé, for a system of printing called by him *rotographic.*

— Henri Lepage, for an improved night table.

— Henri Brewer, for a machine for cutting into sheets the continuous paper as fast as it is manufactured.

— Vincent Pascal Lombardon, for an improved kind of wig.

— Brutus Morrein, for a medallion called by him *family medallion.*

— Jonet-Gault, for a new method of making a coat of one piece of cloth, and with only one seam.

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To Kart-Willer, for an improved oil for promoting the growth of hair.

— Jean Baptiste Hilaire Thomas Bellevue, for an apparatus for heating the air to be used in furnaces for melting iron.

— Pierre Charles Hacquet, for a locomotive carriage fitted up with sails.

ADDITIONAL SPECIFICATIONS INROLLED FOR IMPROVEMENTS BY THE FOLLOWING PATENTEES.

— Jean Lagarde, on his hydraulic machine.

— Achille Decan, on his double-action pump.

— Felix Jean Baptiste Piot, on his improved system of railroads.

— Reybaud, Brothers, and Co., on their distilling apparatus.

— Nicolas Verrier, on his improved waggon for railroads.

— Joseph Sherborough Dyer, for improvements in spinning machines.

— Gabriel Jourdant, on his mechanical process used for conveying goods on land.

— Auguste Stanislas Lebobe, on his improved method of roofing houses with sheets of zinc or other metal.

— Jaillet Junior, of Lyons, ninth improvement on his frame for manufacturing ornamented tissues.

— Payan and Charnier, on their improved method of manufacturing bricks.

— Josue Heilmann, on his improved flyer applicable to spinning machines.

— Thomas Martin Menage, on his improved lamp.

— Joseph Manuel, as transferee of Mr. Duparge, on his improved liquid soap.

— Miss Elizabeth Gervais, fourth improvement on her mechanical apparatus producing a perpetual motion.

— Miss Elizabeth Gervais, fifth improvement on the same.

— Miss Elizabeth Gervais, sixth improvement on the same.

— Miss Elizabeth Gervais, seventh improvement on the same.

— Joseph Maitre, on his portable flour-mill.

— Andre Kœchlin, as transferee of Mr. Nicholson, on his improved spinning-frames.

— Andre Millet, on his improved chimney.

— Galy Cazalat, on his steam-carriage.

— Jean Baptiste Benjamin Laignel, on his improved water-closets.

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To Mrs. Laroche, as transferee of Mr. Armonville, on his improved cooking apparatus.

— Alexandre Francois Selligue, on his new gas-light.

— Louis Cresson d'Orval, on his machinery for manufacturing caoutchouc for surgical purposes.

— De Beaujeu, of his apparatus for making or refining sugar.

— Jules Napoleon Symian, on his instrument for drawing from nature.

— Walker Wood, on his method of manufacturing carbonate of lead.

— Philip Taylor, as transferee of Mr. Hanchett, on his horizontal steam-engine.

New Patents
SEALED IN ENGLAND,
1835.

To Francis Humphrys, of York-road, in the borough of Lambeth, in the county of Surrey, civil engineer, for his invention of certain improvements in marine steam-engines, which improvements are also applicable to steam-engines for other purposes. — Sealed 28th March—6 months for inrolment.

To Philip Augustus de Chapeaurouge, of Fenchurch-street, in the city of London, gentleman, for a machine, engine, or apparatus for producing motive power, which he denominates a self-acting motive power, and is called in France by the inventor "voland moteur perpetuel," being a communication from a foreigner residing abroad. —Sealed 31st March—6 months for inrolment.

To John Fenton, of Sydenham, in the county of Kent, gentleman, for his invention of a composition or material to be used as, or as a substitute for, starch.— Sealed 3d April—6 months for inrolment.

To Henry William Nunn, of Newport, Isle of Wight, lace-manufacturer, for his invention of improvements in manufacturing the ornamental parts of lace, and producing the ornamented or embroidered lace.— Sealed 3d April—6 months for inrolment.

To Robert Gillespie, of Piccadilly, in the county of Middlesex, merchant, for certain improvements on

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trusses or instruments for the cure of hernia or rupture, being a communication from a foreigner residing abroad. —Sealed 3d April—6 months for inrolment.

To George Edmund Donisthorpe, of Leicester, in the county of Leicester, worsted-spinner, and Henry Rawson, of the same place, hosier, for their invention of certain improvements in the combing of wool and other fibrous substances.—Sealed 3d April—6 months for inrolment.

To James Hardy, of Wednesbury, in the county of Stafford, gentleman, for his invention of a certain improvement or certain improvements in the making or manufacturing of axletrees for carriages and other cylindrical or conical shafts.—Sealed 4th April—6 months for inrolment.

To Miles Berry, of Chancery-lane, in the county of Middlesex, civil engineer and mechanical draftsman, for certain improvements in the construction of rotary steam-engines, being a communication from a foreigner residing abroad.—Sealed 8th April—6 months for inrolment.

To Miles Berry, of Chancery-lane, in the county of Middlesex, civil engineer and mechanical draftsman, for certain improvements in the construction of printing machinery or presses, being a communication from a foreigner residing abroad. — Sealed 9th April—6 months for inrolment.

To Hugh Ford Bacon, of Christ College, Cambridge, in the county of Cambridge, gentleman, for his invention of an improved apparatus for regulating the flow of gas through pipes to gas-burners, with a view to uniformity of supply.—Sealed 9th April—6 months for inrolment.

To Samuel Parker, of Argyll-place, Regent-street, in the parish of St. James, in the county of Middlesex, bronzist, for his invention of an improved metallic air and water stop and stopper.—Sealed 14th April—6 months for inrolment.

To John Ingledew, of Edward-street, Brighton, in the county of Sussex, engineer, for his invention of an improved metallic safety-wheel and revolving axle.—Sealed 14th April—6 months for inrolment.

To Joseph Whitworth, of Manchester, in the county of Lancaster, engineer, for his invention of certain improvements in machinery for spinning and doubling

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cotton, flax, wool, silk, and other fibrous substances.—Sealed 14th April—6 months for inrolment.

To Henry Booth, of Liverpool, in the county of Lancashire, gentleman, for his invention of compositions or combinations of materials applicable for the greasing of the axle-bearings of carriages, and the axle-spindles and bearing parts of machinery in general, which he intends to denominate the patent axle grease and lubricating fluid.—Sealed 14th April—6 months for inrolment.

To James Boydell, junior, of Dee Cottage, in the county of Chester, Esq., for his invention of improvements in machinery or apparatus for tracking or towing boats and other vessels.—Sealed 14th April—6 months for inrolment.

To Alexander Stocker, of Yeovil, in the county of Somerset, gentleman, for his invention of improvements in machinery for manufacturing horse-shoes, and certain other articles.—Sealed 14th April—6 months for inrolment.

To Godwin Embrey, of Lane Delph, in the parish of Stoke-upon-Trent, in the county of Stafford, potter, for his invention of certain improvements in ornamenting of china, glass, and earthenware.—Sealed 14th April—6 months for inrolment.

To Sir John Byerley, of Whitehead's-grove, in the parish of St. Luke, Chelsea, in the county of Middlesex, Knight, for a composition which will effect a considerable saving in oil and soap used in the woollen manufactories, being a communication from a foreigner residing abroad.—Sealed 22d April—6 months for inrolment.

To John M'Curdy, of Southampton-row, in the county of Middlesex, Esq., for an improvement or improvements for generating steam, being a communication from a foreigner residing abroad.—Sealed 23d April—6 months for inrolment.

To William Kemp, of Burslem, in the county of Stafford, teacher, for his invention of a machine for raising sunken vessels.—Sealed 23d April—6 months or inrolment.

To Ruben Earnshaw, of Huddersfield, in the county of York, dyer and chemist, for his invention of a certain improvement or improvements in preparing and working wool, for making or manufacturing various fabrics.—Sealed 25th April—6 months for inrolment.

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CELESTIAL PHENOMENA, FOR MAY, 1835.

D.	H.	M.	
1			Clock after the ☉ 3m. 0s.
	—		☽ rises 6 h. 18 m. M.
	—		☽ passes the mer. 2 h. 45m. A.
	—		☽ sets 11 h. 22 m. A.
4	6	39	♂ in conj. with the ☽ diff. of dec. 2. 19. S.
5			Clock after the ☉ 3 m. 27 s.
	—		☽ rises 9 h. 52 m. M.
	—		☽ passes the mer. 6h. 13m. A.
	—		☽ sets 1 h. 48 m. M.
	10	43	☽ in □ or first quarter.
6	22	40	♀ in Aphelion.
	—		Occul. 42 Leonis, im. 13 h. 36 m., em. 14 h. 17 m.
9	21	22	♄ in conj. with the ☽ diff. of dec. 1. 29. S.
10			Clock after the ☉ 3m. 49s.
	—		☽ rises 4 h. 43 m. A.
	—		☽ passes the mer. 10 h. 27 m. A.
	—		☽ sets 3 h. 38 m. M.
11	21		☽ in Perigee.
12			Mer. R. A. 2 h. 50 m. dec. 15. 40. N.
	—		Ven. R. A. 0 h. 54 m. dec. 3. 49. N.
	—		Mars R. A. 8 h. 27 m. dec. 20. 56. N.
	—		Vesta R. A. 5 h. 36 m. dec. 22. 45. N.
	—		Juno R. A. 1 h. 31 m. dec. 6. 9. N.
	—		Pallas R. A. 17 h. 26 m. dec. 23. 26. N.
	—		Ceres R. A. 17 h. 38 m. dec. 21. 19. S.
	—		Jup. R. A. 4 h. 59 m. dec. 22. 23. N.
	—		Sat. R. A. 13 h. 9 m. dec. 4. 22. S.
	—		Georg. R. A. 22 h. 10 m. dec. 13. 3. S.
12			☿ passes the mer. 23 h. 36 m.
	—		♀ passes the mer. 21 h. 36 m.
	—		♂ passes the mer. 5 h. 9 m.
	—		♃ passes the mer. 1 h. 41 m.
	—		Occul. λ in Libra, im. 14 h. 4 m., em. 14 h. 57 m.
	3	13	Ecliptic oppo. or ○ full moon.
15	15	22	☿ in the ascending node.
	—		Clock after the ☉
	—		☽ rises 11 h. 51 m. A.
	—		☽ passes the mer. 2h. 23m. M.
	—		☽ sets 6 h. 2 m. M.
17	6	8	☿ in sup. conj. with the ☉
18	22	38	☽ in □ or last quarter.
19	0	38	♅ in conj. with the ☽ diff. of dec. 4. 46. N.
20			Clock after the ☉ 3 m. 49 s.
	—		☽ rises 2 h. 8 m. M.
	—		☽ passes the mer. 7h. 0m. M.
	—		☽ sets 0 h. 2 m. A.
	5	12	☿ in Perihelion.
21	20	23	♅ in quad. with the ☉
23	19	55	♀ in conj. with the ☽ diff. of dec. 1. 41. N.
25			Clock after the ☉ 3m. 28s.
	—		☽ rises 3 h. 19 m. M.
	—		☽ passes the mer. 10h. 26m. M.
	—		☽ sets 5h. 48m. A.
	5		☽ in Apogee.
27	1	32	Ecliptic conj. or ● new moon.
28	5	33	☿ in conj. with the ☽ diff. of dec. 0. 48. N.
	6	29	♃ in conj. with the ☽ diff. of dec. 1. 23. S.
	11	48	☿ in conj. with ♃ diff. of dec. 2. 9. N.
29	18	58	♀ greatest Hel. Lat. S.
30			Clock after the ☉ 2m. 54s.
	—		☽ rises 5 h. 39 m.
	—		☽ passes the mer. 2h. 22m. A.
	—		☽ sets 11h. 8m. A.
	18	28	☿ greatest Hel. Lat. N.

The Eclipses of the Satellites of Jupiter are not visible from the 17th day of May until the 16th day of July, Jupiter being too near the Sun.

Venus is a Morning, and Jupiter an Evening Star throughout the Month.

J. LEWTHWAITE, Rotherhithe.

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CONJOINED SERIES.

No. XXXVIII.

Recent Patents.

To LEMUEL WELMAN WRIGHT, *of Sloane-terrace, Chelsea, in the county of Middlesex, engineer, for his invention of certain improvements in machinery for cutting tobacco, and which machinery may be applicable to other useful purposes.*—[Sealed 10th July, 1834.]

THESE improvements in machinery for cutting tobacco have for their object a mode of applying cutting knives to the leaves of tobacco without previously pressing the leaves into cakes, which is effected by feeding the tobacco through a long trough, and thereby bringing it forward to the cutters progressively by means of travelling bands.

These improvements may be adapted in various

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ways, as shown by the accompanying drawings (see Plate VII.). Fig. 1, is a horizontal view of a tobacco-cutting engine on the improved principle; fig. 2, is a vertical section of the same taken longitudinally, showing the construction of the feeding apparatus; fig. 3, is an end view of the engine, taken in front of the cutters; and fig. 4, is a partial elevation, taken on the opposite side to fig. 2: *a, a,* is the trough, in which leaves of tobacco are spread out lengthwise in sufficient quantities as to thickness to allow them to be carried between the pressing rollers; *b, b,* are a pair of parallel rollers, over which an endless band is passed, which, as it travels, carries the tobacco forward; *c, c, c.* are the bottom plates of the trough of iron, or other substantial material, for the purpose of forming a firm bed to feed upon; *d,* and *e,* are two large rollers; and *f,* and *g,* are two smaller rollers, mounted on axles turning in bearings in the side plates of the trough *a.*

Over the rollers *d,* and *e,* an endless band *h,* of strong leather, or other fit material, is tightly distended; which band *h,* passes through an opening in the bed plate above the large roller *d,* and travels along the upper surface of a part of the bed plate, and descends through another opening over the small roller *g.*

The rollers *e,* and *f,* with a similar endless band *i,* passed round them, forms the pressing apparatus. A piece *k,* is fastened into the front of the trough for the purpose of confining and conducting the compressed layers of tobacco leaf to the revolving cutters. The larger rollers *d,* and *e,* are connected by toothed wheels *l, l,* on their axles, shown in fig. 4.

The cutters are flat blades *j, j,* attached to the face of a vertical wheel *m,* which is mounted on a lateral shaft *n,* shown in figs. 1, and 4. The cutter wheel *m,*

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may be driven by a winch, or by any other means may be made to revolve, and to pass the cutters round in front of the delivering trough, as shown in fig. 3. At the reverse end of the shaft *n*, a cam wheel *o*, is fixed, which has as many raised parts as there are knives on the cutting wheel, and corresponding therewith. This cam is shown in the elevation at fig. 5, taken at the back end of the shaft *n*.

As the wheel *m*, and shaft *n*, revolve, the cam *o*, will be made to act against the lower end of a lever *p*, which hangs upon a joint in a stud *q*, fixed at the outside of the trough. From this lever *p*, the click *r*, is suspended; the point of which click is held in the teeth of the ratchet wheel *s*, by a spring. This ratchet wheel *s*, is fixed at the end of the screw shaft *t*, (see fig. 4,) which screw takes into the teeth cut in the concave periphery of the wheel *u*, on the axle of the roller *e*.

It will now be perceived, that as the cutter wheel *m*, and its axle *n*, with the cam *o*, revolve, the inequalities of the surface of the cam will cause the lever *p*, and with it the click *r*, to rise and fall, and, in so doing, to take up one tooth of the ratchet *s*, at every stroke. Thus, by successive strokes, the ratchet wheel *s*, and screw shaft *t*, will receive a slow rotary movement; and the screw upon this shaft, by taking into the wheel *u*, will cause the upper or pressing roller *e*, to revolve.

The connecting wheels *l*, *l*, fixed upon the axles of the rollers *d*, and *e*, will cause those rollers to revolve simultaneously, and carry forward the endless bands *h*, and *i*; and a band from a pulley on the axle of the roller *d*, passed over a pulley on the end of the axle of one of the rollers *b*, shown by dots in fig. 2, gives motion to the endless bands; by which means the tobacco in the trough *a*, will be progressively advanced and

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pressed as it passes between the rollers and the endless bands, and ultimately will be discharged from the trough in front of the machine, where it will be met and operated upon by the knives on the face of the wheel *m*, and cut into fine shreds.

As it is necessary to keep the cutters pressing steadily up to the front of the trough, it is proposed to apply the edge of a wheel *z*, against the back of the cutter wheel, mounted in a bearing with adjustment, as shown in the horizontal view, fig. 1.

A cylindrical roller *w*, of wood, or other fit material, covered with cloth, is mounted on a vertical shaft at the under part of the machine, and is made to revolve by means of a toothed wheel *x*, on the lateral shaft *n*, which takes into a pinion *y*, on the vertical roller shaft. The periphery of this roller comes in contact with the flat surfaces of the knives as they pass, and, by revolving with about double the speed of the knives, and in the same direction, acts as a wiper to remove the juicy matter which exudes from the tobacco, and adheres to the knife in the operation of cutting. A sufficient quantity of water must be applied to the surface of this roller, for the purpose of lubricating the adhesive matter which may attach to the cutting edge of the knife.

Fig. 6, is a horizontal view of a tobacco-cutting machine, having the same apparatus for feeding as described above, but with knives *j*, *j*, mounted upon the peripheries of two wheels, and revolving in front of the machine. Fig. 7, is a side elevation of the same.

In this construction of cutting engine, the driving power is to be applied by a winch or rigger to the transverse shaft *a*, at the end of which there is a bevel toothed wheel *b*, taking into a corresponding wheel *c*,

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on the lateral shaft *d*. At the reverse end of this lateral shaft the cam *o*, is affixed, an end view of which is shown at fig. 8.

By the rotation of the cam *o*, the lever and click *p*, and *r*, are actuated, as in the former instance, for the purpose of driving the screw shaft *t*, and bringing the tobacco forward in the same way as described in reference to figs. 2, and 5. In this instance the roller *w*, which cleans the face of the knife, is placed upon a horizontal axle mounted in bearings behind the cutter wheel, and which is driven by a small pulley on the axle of the cleaning roller, and a band passed over a larger pulley on the axle *a*, as shown in figs. 6, and 7.

Another modification of the improved tobacco-cutting engine is shown in the front elevation, fig. 9, and side view, fig. 10.

In this engine the trough and feeding apparatus are intended to be of the same construction as in figs. 1, to 5; but in this instance the cutting knife is a lever. In the side view, fig. 10, *a*, is the knife secured to the lever *b*, which lever works up and down vertically upon a fulcrum pin *c*, and is guided by the bracket piece *d*.

The tobacco is brought forward upon a board by means of the endless travelling band and rollers, as shown in the former figures, and is cut by the chopping action of the lever knife. This action of the chopping lever is produced by the rotation of the crank *f*, fixed on one end of the shaft which carries the fly-wheel *h*: this crank is connected to the end of the chopping lever by a rod *g*.

At the reverse end of the crank shaft *f*, the cam *o*, is affixed, which, as before, actuates a lever or rod *p*, and click *r*, taking into the ratchet wheel *s*, on the end of the screw shaft *t*, which works into the periphery of the

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wheel *u*, and causes the rollers to conduct the tobacco forward, as before described.

As it is necessary to keep the cutters pressing steadily up to the front of the trough, it is proposed to apply the edge of a wheel *x*, against the back of the cutter wheel, mounted in a bearing, with adjustments, as shown in the horizontal view, fig. 1.

Another mode of feeding and cutting is proposed, in which the tobacco leaf is to be laid into a trough or box with a top board, which is to be forced down by screws to produce any degree of pressure and consequent compactness of the leaves that may be required; and the tobacco is to be conducted forward to the knives by a follower forced up by a screw, which may be worked in the usual way. The knives or cutters to be adapted in this instance, may be of any of the constructions described in the foregoing figures.

The Patentee says, in conclusion, "I desire it to be understood that I do not intend to claim as my invention any of the separate parts of this machine; but I do claim the improved arrangement, and, in particular, the peculiar construction of the feeding apparatus represented in the drawings, in connexion with the several other parts, for the intents and purposes above explained and described."—[*Inrolled in the Rolls Chapel Office, January*, 1835.]

Specification drawn by Messrs. Newton and Berry.

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To STEPHEN PERRY, *of Wilmington-square, in the county of Middlesex, gentleman;* EDWARD MASSEY, *senior, of King-street, Clerkenwell, in the same county, watch-maker; and* PAUL JOSEPH GAUCE, *of North-crescent, Bedford-square, also in the same county, artist, for their invention of certain improvements in pens and pen-holders.*—[Sealed 20th September, 1834.]

THIS invention, as regards pens, consists in the following improvements; that is to say, first, in a new additional side cut or cuts, slit or slits, which give great additional elasticity, or, as we technically call it, *relief*, to the pen; for, inasmuch as all metal pens are subject to a certain degree of rigidity, the object of the manufacturer should always be to relieve them as much as possible from that quality; secondly, in an adjustable or sliding spring, acting downward, but not laterally, upon the nibs, and increasing or diminishing the resistance and consequent hardness of the pen, according as the said spring is advanced towards or caused to recede from the point of the pen; thirdly, in so forming the pen as to leave a spring from the upper side of which the shoulders and nibs of the pen are projected, as hereinafter more particularly described; fourthly, in making the shank or tail of the pen elastic, in which case the pen is held at a given part, or point, or fulcrum, somewhere between the two extreme ends.

And further, as regards pen-holders, the said invention consists in the following improvements; that is to say, first, attaching the pen to a stick by means of an Indian-rubber band, or Indian-rubber bands; secondly, in making the tube at the end of the stick which holds the pen of spiral wire, one coil or turn being so closely wound upon the other, as not to allow any action of the pen

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in a direct line to or from the end of the fingers, or in that direction which has been termed by some longitudinal elasticity, but admitting of every requisite variety of lateral eccentric action; thirdly, in a flat, arched, or other spring at the end of the stick, having a crimped cap as the receptacle for the shank or tail of the pen, in which case the shank or tail of the pen must be crimped to fit the holder, which said crimping will be found greatly to steady the pen in the holder; and, lastly, in a screw-pin and fulcrum, applicable to our aforesaid elastic-tailed pen.

In Plate VIII. fig. 1, is a pen classed under our first head of improvement, and represents by the black line our said additional side cut or slit, which it will be observed passes beyond the centre of the back of the pen, and thus destroys the resistance offered at that part by its arched form. This cut may either enter another cut or an aperture just beyond the centre of the back; and we prefer it to be in the left side, but it may be in the right side, as shown in fig. 2.

Fig. 3, is a pen classed under our second head of improvement, and is furnished with one of our said adjustable or sliding springs, in which it will be observed that there is a slit in the spring corresponding with the slit in the pen; and the spring may be slided towards or from the point of the rib by applying the nail to the notch or aperture *c*. The length of the sliding action is determined by the four shoulders *e*, *e*, *e*, *e*, formed by diminishing the size of the shank at that part, as shown in the profile view at fig. 4; the spring just hooks or catches over the edge of this diminished part, as shown in the underside view at fig. 5.

Fig. 6, is a pen classed under our third head of improvement: *a*, is a flat under spring, from the upperside

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of which it will be seen the nibs project. Fig. 7, is a view of the underside of the pen, showing that the spring is divided down the middle, and that thus there is an underspring to each side of the pen, as at *a*, *a*.

Fig. 8, is a pen classed under our fourth head of improvement: *g*, being a flat elastic back or tail, shown in plan at fig. 9; fig. 10, is another pen of this class, where the flat elastic back or tail is placed below the nibs and shoulders of the pen; fig. 11, is a plan of the same; fig. 12, is another pen of the same class, having a very thin, flat, elastic tail *j*.

Fig. 13, is a pen with a crimped shank or tail, to fit a particular kind of holder, which will be hereafter explained; fig. 14, is an end view of the crimp.

Fig. 15, is another variety of our flat elastic back; the parts *i*, *i*, being flat and elastic, though at the extreme end there is a small portion of an arched form to set into the ordinary holder; fig. 16, is a side view of fig. 15, and shows the turn-over of the central part to form an ink-holder. These sorts of turns-over of the central part of the metal admit of many varieties, another of which is shown in figs. 17, and 18.

And now of the pen-holders. Fig. 19 is a pen-holder, to which the pen is fastened by means of the Indian-rubber band *m*; fig. 20, is another holder of the same class, the pen being fastened to the holder by two bands of Indian-rubber thread at *n*, and *o*. This plan is well adapted for the thin, flat, spring-tailed pen particularly, if the wood of the stick be cut away at *p*, as here shown.

Fig. 21, is a pen-holder with the spiral wire tube, hereinbefore mentioned, shown at *r*, to give every required kind of lateral elasticity to the pen, without allowing any of what has been termed longitudinal

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elasticity; fig. 22, is an end view of the spiral tube, showing that it is wound flat at one side; fig. 23, represents our crimped pen-holder, with a crimped-ended pen in it; the crimped end joins on to the tube which fits on to the stick by being made in one piece with a flat elastic spring, shown at *s*, which gives all the effect of our flat under-spring pens, with the advantage of the pen being more firmly held in the holder, in consequence of the crimping of both; fig. 24, is an end view of the crimped holder.

Fig. 25, is one of our fulcrum pen-holders for spring or elastic-tailed pens, whether such spring or elasticity is obtained by making the tail of flat elastic metal, or of arched elastic metal, or otherwise. At *t*, there is a space cut in the holder, just to let the substance of the pen pass through; at *v*, is a screw which screws down on the pen; *z*, being the fulcrum or point of rest, from which both ends play; *w*, is a guide pin or stud, which passes up through a hole made in the tail of the pen for the purpose. The effect of this arrangement will be, that when the nib of the pen is pressed upon in the act of writing the tail will rise in proportion, thus giving a delightful elasticity to the pen. Fig. 26, is an end view of fig. 25.

The fulcrum may be obtained generally as well by drawing the pen up at a certain point, as by pressing down upon it at a certain point: the former of which plans is shown in section at fig. 27; *x*, is a spring; *y*, a screw passing through it and through the holder (which is here shown as a hollow tube), as also through the pen, below which is a nut to prevent its return.

The pen here used should be a slit-tailed one, such as is shown at fig. 28. By this arrangement the spring *x*, will always be drawing up the pen to the holder at

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that point where the nut is placed, and *z*, will thus become a fulcrum for both ends to play from.

Now, whereas we claim as our invention those improvements in pens comprised under the four heads mentioned in the early part of our specification, and those improvements in pen-holders comprised under the other four heads there also mentioned.—[*Inrolled in the Inrolment Office, March*, 1835.]

To David Rees, *of Brecon, South Wales, woollen-manufacturer, for his invention of improvements on drags or apparatus to be applied to carriages.*—[Sealed 7th August, 1833.]

The drag which forms the subject of this patent is an iron shoe, attached by a joint to a lever or arm suspended under the body of the stage-coach, or other carriage; which shoe may be raised up out of operation, or lowered, to lock the wheel by a string or chain from the coach-box, or from behind, without the necessity of the coachman or guard dismounting, or, indeed, without the carriage stopping its progress.

This invention, we regret to say, appears to possess very slight claims to novelty. Plate VII. fig. 11, represents the manner in which the Patentee proposes to construct his drag: *a*, is the axletree, the wheel shown by dots being attached in the ordinary way; *b*, is an arm or lever connected by a joint to the bracket *c*, affixed to the axletree; *d*, is the shoe let down under the wheel, and in the act of holding it.

The pivot or fulcrum of the lever *b*, is placed at a little distance from the centre of the wheel, in order

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that when it is raised up, as shown by dots, the shoe may hang free from the periphery of the wheel; and we presume that the joint is placed obliquely, for the purpose of drawing the shoe on one side when raised; but that is not described in the specification.

A chain *e*, attached to the under part of the carriage, is connected to the end of the shoe, for the purpose of holding it under the wheel when in operation, or of suspending it when out of use, as shown by dots. Another chain or cord *f*, is attached to the lower end of the lever or arm *b*, and passed over pulleys up to the seat of the coachman or guard; by means of which cord or chain *f*, the drag may be let down without dismounting, or stopping the progress of the carriage, by releasing the upper part from a catch or holdfast; and it may be drawn up and made fast to the catch again with perfect ease.

A variation or modification of this invention is exhibited at fig. 12, in which the drag is designed to act within the wheel, and free from it; the shoe *d*, being attached to a strong arm or lever *b*, having its fulcrum joint at *c*, in a bracket affixed to the axletree of the carriage. The shoe has a joint, or some sort of connexion with a rod *g*, behind the lever, which we cannot understand properly from the specification. It appears, however, that by pulling a string *h*, the fixed position of the shoe is intended to be unlocked, when it is said the wheel will come to the ground, and the shoe may be drawn up into the position shown by dots.—[*Inrolled in the Inrolment Office, February*, 1834.]

Drags for carriages, upon constructions very like the above, will be found described in the specification of Johnson's patent, London Journal of Arts, vol. viii. First Series; and Parker's patent, vol. ix. Second Series.

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To Edwin Appleby, *of Doncaster, in the county of York, iron-founder, for his invention of certain improvements in steam-engines.*—[Sealed 29th January, 1833.]

The improvements herein proposed apply, first, to the form, construction, and arrangement of the parts of a boiler for generating steam; and, secondly, to the peculiar adaptation of the parts constituting a reciprocating rotary steam-engine. The Patentee has arranged his improvements under eight heads; viz.—

First, in so constructing a boiler for generating steam, that the furnace and flues shall be surrounded by the water within the boiler, in order to expose the water to a greatly extended heating surface, the flues being carried upwards through the boilers by contorted passages, which cause the flames and heated vapours to be reverberated in their course, and allow no greater quantity of heat to pass off into the chimney than is absolutely essential to produce a good draft.

Secondly, in feeding the boiler with water by a force pump, through a pipe which has a stop cock, opened and closed by a lever connected to a float on the surface of the water within the boiler, this pipe having a weighted valve, capable of resisting the pressure of the steam within, but allowing the overflow or escape of that portion of the supply of water which the boiler may not require.

Thirdly, in placing within the boiler a safety tube, having a fusible plug at that end which is immersed in the water, the plug being formed of some metal or alloy, which readily melts at a temperature a little above that of boiling water. This fusible plug on the water, diminishing and receding from it, will, by the

increased temperature, necessarily melt, and allow the steam to blow through and escape by the pipe; the outer end of which being furnished with a whistle, will give an alarm whenever the boilers is deficient of water.

Plate VII. fig. 13, represents the improved construction of boiler in section, taken vertically through the middle, for the purpose of showing the form and arrangement of the internal parts of the boiler, the flues, and furnace; *a, a, a,* is the outer case, forming the external part of the boiler, proposed to be made of plate iron; *b,* is the furnace; *c, c, c,* the internal case of the boiler, also of plate iron, forming the flues leading to the chimney *d.* In the middle of the boiler, surrounded by the flues, are three circular chambers *e, e, e*; from each of which chambers respectively three lateral passages, *f, f, f,* lead off, for the purpose of producing a free circulation of the water through all parts of the boiler.

The presumed novelty in this boiler is in the peculiar form and arrangements of its parts, as exhibited in the figure, and claimed under the first head above recited.

The second feature is the feeding apparatus, by which the water is supplied to the boiler, consisting of a conical tube *g,* with a cock in the lower part, opened and closed by a lever, acted upon by the rising and falling of the float *h.* According to the height of the water in the boiler, so will the float open the cock for the admission of water, or close it when the boiler is sufficiently full. Into this tube water is injected by a force pump through the pipe *i.* A valve in the upper part of the tube is weighted sufficiently to overcome the pressure of the steam within the boiler, but when a suitable supply of water has been pumped into the boiler, or the pump delivers more than is required, the

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resistance which the water in the tube then meets with will cause the valve to rise, and allow the surplus water to pass off by the pipe *k*.

The third feature, namely, the safety tube, is shown at *l*: the lower part of this tube at *m*, is closed by a plug of metal, capable of fusing at a temperature little higher than that of boiling water. When the water in the boiler has sunk below the level of the metal plug *m*, the plug immediately melts and falls down into the water, leaving the tube open for the steam to blow through; and which, in making its exit, passes through a whistle *n*, and by the noise produced, gives the alarm and notification that the boiler wants water, and consequently that it is immediately necessary to quench the fire.

The remaining heads of the invention apply to the reciprocating rotary steam-engine, and are described as consisting, fourthly, in fixing two-winged or leaf-formed pistons upon a shaft, turning in the axis of the working cylinder of the engine. The wings projecting in opposite directions from the shaft, and vibrating in arcs of about three-eighths of a revolution in the two separate compartments, formed by two angular or wedge-shaped partitions, fixed in the interior of the cylinder. The shaft or axle of the wings works through stuffing boxes in the end plates of the cylinder; and a crank on the end of the shaft is connected by a rod to a crank on the main shaft of the engine, for the purpose of communicating the reciprocating action of the wings as a driving power.

Fig. 14, represents the engine, the working cylinder being shown in section; the base or foundation on which the engine is erected may be of brick or stone: *a, a*, is the working cylinder, fixed upon suitable bear-

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ings; *b, b,* are the steam-stops, or wedge-formed partitions, which divide the cylinder into two compartments; *c, c,* are the wings or pistons affixed to the axle *d.* At the end of this shaft *d,* a crank *e,* is attached, to which a rod *f,* is connected; the reverse end of this rod is attached to another crank *g,* affixed to the end of the main shaft *h,* supported upon standards.

The edges of the wings or pistons *e, e,* are packed in the usual way, to render them steam tight; and the steam being admitted by the valves *i, i,* the pistons are forced round in the chamber, in arcs of about three-eighths of a revolution, moving the shaft and crank *e,* in the same arc, and consequently the crank *g,* also, which, however, being of smaller radius, passes through a greater arc, namely, through an arc of half its revolution.

By these means the main shaft *h,* is turned half round, and the excentrics fixed upon that shaft are moved also, which, through the agency of the rods *k, k,* now turn the valves *i, i,* into the positions which lets off the steam from the chambers behind the pistons to the eduction pipes, and admit steam on the opposite sides, for the purpose of forcing the piston or wings *c, e,* back again, that is, through similar arcs in the reverse direction.

In this way, by the continued reciprocating action of the pistons (assisted, we presume, by a fly wheel, though not shown, to overcome the dead points), the main shaft is kept in a continued rotary motion, for the purpose of exerting a driving power as a first mover.

It is proposed, as a fifth head, to attach the two wing-formed pistons each to a distinct axle, and to connetc those axles together by a concentric socket

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joint in the axis of the cylinder, the outer end of the axle passing through stuffing boxes in the end plates, and having a crank on each; the object of which is, that the wing-formed pistons shall mutually act as abutments to each other, and dispense with two wedge-shaped partitions, dividing the cylinder into two compartments, as before described. In this case cranks are formed at both of the outer ends of the shaft and rods, led off to the main shaft, as in the former instance.

The sixth head of the improvement consists in constructing the induction and eduction valves of a steam-engine in a cylindrical form, instead of the sliding valves employed for that purpose. Fig. 15, shows one of these valves detached from the engine, and in perspective its situation when connected to the engine and at work, being between the steam and eduction pipes at *i*, *i*, in fig. 14. The valve is a hollow cylinder, having a partition in the middle to divide it into two compartments; the one cavity being intended to conduct the steam from the steam pipe into the working cylinder of the engine, the other for its egress, after having produced the stroke of the piston. The precise way in which these valves are intended to act is not very clearly explained in the specification, or shown in the drawing; but it may be readily conceived that they work in cylindrical sockets with slots, and that the rods *k*, *k*, moved by the excentrics on the main shaft, are the agents by which the valves are turned round in their sockets.

The seventh head of the invention is described as consisting in "packing the stuffing boxes of a steam-engine with a cord, taking one turn round the piston rod or shaft, the two ends of which cord pass out through two grooves in opposite directions, made in

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the rim of the stuffing box and in its cap, the recesses and grooves in the stuffing box and in the cap corresponding to the half dimensions of the cord; and in causing each end of the cord to be attached to a spring to keep up a constant tension of the cord, in order to its embracing the piston rod or shaft sufficiently tight to prevent the escape of steam without creating any friction."

The eighth and last head of the invention consists in actuating the engine by hydrostatic pressure, that is, in working the vibrating wing-formed pistons by the force of water, instead of steam. No details of the mode of adapting water are given.

The Patentee concludes by saying—"And I do lastly declare, that the points of novelty and utility which I claim to have invented, are the eight parts of my said invention herein first declared, as carried into effect, in the manner herein described; the other common parts of steam-engines being shown and referred to merely in elucidation of my invention.—[*Inrolled in the Inrolment Office, July,* 1833.]

The Patentee or his adviser ought to have better informed themselves as to the schemes which have been suggested in connexion with steam-engines: the greater part of the plans proposed above must be perfectly familiar to our readers, and ought not to have been claimed as novelties.—EDITOR.

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To James Dutton, *of Wootton-under-Edge, in the county of Gloucester, for his invention of a certain improvement or improvements in dressing or finishing woollen cloths, and for the method or methods of, and apparatus for, effecting the same.*—[Sealed 13th May, 1834.]

These improvements in dressing or finishing woollen cloths, consists in the application of pressure with heat and humidity to the cloth in a machine or apparatus, by means of which portions of the cloth may in succession be acted upon until the whole has received the required dressing.

To effect this object, the Patentee employs a pressing apparatus of any construction, by which the process may be conveniently performed; in which apparatus it is necessary to have one fixed broad and flat surface, or table, equal to the width of the cloth, and of suitable dimensions in the other direction, to receive about a yard of the cloth in length. A platten, or flat metal plate of corresponding dimensions, must also be adapted to lay upon the cloth when spread over the said table; which platen must be made to rise and fall by machinery, and to be acted upon by powerful leverage, or other means, in order to give the required pressure to the cloth so spread between the two surfaces; or the platen may be fixed, and the table be made to rise and fall by suitable machinery connected with an apparatus, as an hydraulic press, or any other sufficient power.

By these means it is proposed to effect the pressure upon a portion of the cloth extended, say the entire width, and about one yard in length, at every operation; and after this portion has been sufficiently pressed

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(which it is calculated may be done in about five minutes, but that will depend upon the quality of the cloth, of the colour, and the required dress), then take off the pressure, and draw the cloth forward, bringing another portion in like manner between the table and plate, and so on until the whole length of the piece of cloth has by successive operations been submitted to the pressing process.

In order to render the effect of this process of pressing permanent, it is necessary to employ, in connexion with the pressure, heat and humidity. This it is proposed to do, by placing a steam or hot-water chamber in the table of the press, and by bringing the cloth under operation in the wet state in which it usually comes from the gig mill.

An apparatus to accomplish this object may be variously constructed. It is considered, however, sufficient to exhibit one machine, which the Patentee has found to be convenient, eligible, and effective, for the exercise of the improved method of dressing woollen cloths.

"This is a modification of a printing press, on the same plan as those usually manufactured by Messrs. Cope and Sherwin, of London, and which modification of press is claimed as applied to the dressing of woollen cloth by the improved method; but I wish it to be understood, that I do not intend to confine myself, that is, the exercise of my improved method of dressing woollen cloth, to this, or any other particular construction of press."

The Patentee claims the improved method of dressing woollen cloths by any and every construction of machine in which heat and humidity may be brought into operation, with pressure upon portions of the woollen cloth successively, until the whole surface of the piece has been sufficiently dressed.

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In the accompanying drawings (see Plate VIII. fig. 37,) is a front view of the press: *a, a*, is the table, firmly fixed to the bed *b, b*. The platen *c, c*, is suspended by the perpendicular piece *d*, which slides up and down in a recess in the head frame *e, e*; in which head frame compound levers are introduced, as in ordinary printing presses, represented by dots. These levers are connected by joints to other levers *f, g, h, i*, and *k*, shown in the figure; and the power of the pressman being applied to the handle *c*, the platen is made to descend, and to press with very considerable force upon the table below.

Fig. 38, is a side view of the press, the respective letters indicating the same parts as those already described.

Having explained the construction of the press, we now describe the peculiarity of the table, which will be required to be kept hot, and of one uniform temperature, during the whole of the successive operations upon a piece of cloth. Fig. 39, is an edge view of the table, detached from the press; and fig. 40, is a section of the same taken vertically.

The table is a box or hollow vessel, divided by a horizontal plate or partition into two compartments: the upper chamber is to be filled with water, and the lower one with steam; both of which chambers may be supplied by any convenient means through pipes, with stop cocks inserted into the side. The compartments may be made steam-and-water tight, by bolts or screws passed through flanges, with cement in the joints; and in order to prevent the radiation of heat, the box or vessel should be encased with wood round its edges, and the vacant spaces filled up with pounded charcoal, or other imperfect conductor of heat. It may be also added, that as the colours of some cloths might be injured by

the occasional oxydation of the iron, it would be desirable to cover the upper surface of the box, forming the table, with a thin plate of pewter or other metal, least susceptible of oxydation. For the same reason, the face of the platen should be covered also.

In order to apply this machine to the purpose of dressing woollen cloth, it is necessary, in the first place, to fill the upper chamber of the box or tables with water, and then the lower chamber with steam, for the purpose of heating the water; and having determined the temperature at which I mean to work (say 200° Fahrenheit; but that must depend upon the quality of the cloth, and the required dress), I regulate the supply of steam accordingly, which will keep the water, and consequently the upper surface of the table, at one uniform temperature, or nearly so, during the continuance of the operation.

The piece of cloth is now to be brought, in its wet state, from the gig mill, and placed in a trough or suitable vessel, or perhaps wound on a roller. I then draw the cloth on to a flat wooden table, shown at *m*, in fig. 38, and connect its lists to a series of habiting hooks on each side, as is the practice in shearing machines, for the purpose of distending the cloth to one uniform width. When the cloth has been thus distended, it may be drawn forward, allowing the habit rods *n*, to slide along the side bars *o*, *o*; by which means the cloth will be brought between the table and platen, as shown in fig. 38, ready to be pressed. The platen is now brought down upon the table by means of the levers, in the ordinary way of working printing presses, and a very considerable pressure is thereby given to the cloth. While this pressure, in conjunction with the heat and humidity, is operating upon the portion

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of cloth, the habiting hooks may be removed from the lists, and the habit rods *n*, slidden back again upon the bars *o*, *o*, in order to hook on to the lists of another portion of the cloth to distend it, ready to be brought forward in like manner. It must here be remarked that, as a succession of pressing operations are intended to give the same smooth and equal appearance to the face of the cloth, as if it had been operated upon by one uniform extended pressing surface, equal to the whole length of the piece, the parts of the cloth at which the successive operations meet each other, must not be allowed to exhibit any mark or junction, I therefore chamfer off blunt, bevel, or round the edges of the platen; so that the precise point at which the pressure finishes in one operation, and commences in the next, may not be perceptible. In this way I am enabled to blend the several successive pressing operations along the length of the piece, and to produce the same appearance as though the pressure had acted at once upon the whole extended surface.

As a convenient mode of conducting the cloth forward, I pass it over a small carrier roller *p*, mounted in brackets, extending from the frame of the press, and I attach the end of the cloth to a roller, mounted upon an axle in a suitable standard or frame *q*; and as the cloth is required to be drawn forward, I turn the winch upon the axle, and wind it on to the roller.

The Patentee concludes by saying, "Having now described my improved method of dressing woollen cloth by pressing it in portions with heat and humidity, I beg it to be observed that I do not intend to confine myself to pressing exactly one yard in length at each operation, as a greater or less length of cloth may be operated upon, if a platen and table of greater

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or less dimensions should be found to be more convenient. And as to the width of the platen, in order to accommodate it to the pressing of broad cloth of various breadths between the lists, I have occasionally found it convenient to enlarge the platen, by attaching suitable pieces to its sides, as at *r*, *r*, fig. 37. Pieces of this sort, of different widths, may be provided, in order that, by displacing those of one width, and attaching others, the platen may be brought to such dimensions as may suit the width of any particular cloth; and they may be attached, as shown by screws, or by any other means that may be found convenient.—[*Inrolled in the Rolls Chapel Office, November,* 1834.]

Specification drawn by Messrs. Newton and Berry.

To Charles Wilson, *of Kelso, in the county of Roxburgh, North Britain, for his invention of certain improvements applicable to the machinery used in the preparation for spinning wool, and other fibrous substances.*—[Sealed 17th June, 1834.]

The invention which forms the subject of this patent, is intended to supersede the necessity of employing the machine called the slubbing billy, in preparing wool for spinning; and consists in the adaptation of certain pieces of mechanism, as auxiliaries to an engine for scribbling or carding wool.

The wool having been scribbled in the ordinary way, and deposited in loose untwisted bands in a series of receiving cans, as commonly practised, the first feature of the invention applies to the manner of feeding or

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conducting those bands from the cans into a second scribbling or carding engine, which is done by leading those bands of sliver over a series of horizontal rollers, mounted in a frame at the feeding end of the engine; and by the rotation of these rollers, passing the bands severally through distinct guides or eyes, and between grooved rollers and partitions, in order that the bands of wool may not be indiscriminately mixed on the carding cylinder, but that they may be carded in the same form, and for the purpose of being taken off at the doffer end of the engine again in bands, and so conducted forward and wound in bands as slubbings on bobbins, ready for the subsequent operations of mule or throstle spinning.

The second feature is the adaptation of a cylinder with bands or ribs of cards round it, and intervening blanks; which cylinder is employed as a stripper, in place of a doffing comb, to take off or strip the slivers of wool from the doffing cylinder, in the same form in which they were fed into the engine at the reverse end.

The fibres of wool are to be removed from the points of the cards of this cylinder by a fluted roller turning in contact with it, by which means the slivers again assume the form of bands of slubbing, and are passed between a pair of rollers to compress them. They are then conducted between two straps, or a doubled endless band, travelling in opposite directions, in order to give a slight degree of twist to the fibres of the wool; and after this the slubbings are passed between another pair of rollers, turning something faster than the former pair, for the purpose of drawing out the fibres, and slightly elongate the bands of slubbing.

The slubbings are then wound or lapped upon a

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roller or long bobbin, which is made to turn upon its axis by the friction of its contact with the surfaces of two revolving rollers below, driven by the gearing wheels of the engine; and this lapping roller has a short lateral movement to and fro in its carriage, for the purpose of causing the several bands of slubbing to be wound in a slight degree spirally, or in helical curves round the bobbin.

There appears to be but little novelty in this invention, as our readers will perceive by referring to the specifications of Bodmer's patent, vol. xii. of our First Series, page 63; Dyer's patent, vol. xiv., page 6, also First Series; Seldon's patent, vol. viii., Second Series, page 74; and again vol. i., Conjoined Series, page 309; and Simpson's patent, vol. v., Conjoined Series, page 250. We therefore consider the foregoing description sufficient without figures, as the drawings which accompany this specification are for the most part minute details of machinery generally known to cotton-spinners.

The claims of the Patentee are these:—First, to the mode of feeding the slivers into the carding engine immediately from a series of cans, and of passing it in distinct bands over guide rollers into the engine. Second, to the adaptation of a cylinder with bands of cards for stripping or taking off the slivers from the doffer cylinder: and third, the employment of a second pair of rollers for the purposes of drawing or slightly elongating the slubbings.—[*Inrolled in the Inrolment Office,* 11 *December,* 1834.]

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To BENJAMIN DOBSON, *of Bolton-le-Moors, in the county of Lancaster, machinist, and* JOHN SUTCLIFF *and* RICHARD THRELFALL, *of the same place, machinists, for their invention of certain improvements in machinery for roving and spinning cotton and other fibrous materials.*—[Sealed 6th February, 1834.]

THIS invention of certain improvements in machinery for roving and spinning cotton and other fibrous substances, consist in certain arrangements of machinery, by which are effected certain movements in the machines known by the names of the stretching frame and the mule; which movements have heretofore, in the machines of the ordinary construction, been performed by hand, so that the application of this invention renders ordinary machines of this description what is called "self-acting."

The manner in which the invention is to be performed and carried into effect will be clearly seen by reference to the annexed drawings, (see Plate VIII.) in all which various views and sections of machinery letters and figures of reference are used, the same letters and figures of reference denoting the same part throughout the whole.

In these drawings application of our invention is made to the machine called the mule, as hereinafter described; and this application will be found sufficient to enable any person conversant with spinning, or spinning machinery, to make a similar application of our invention to the roving or stretching frame when it is required.

But before we commence a description of the drawings, we shall briefly state the various movements required

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to be performed by the machine called the mule, to render the following description of the drawings more clear.

The spinning action, or the putting in of the twist to the yarn or thread, manufactured on this machine, proceeds (as is well known to spinners) during the coming out of the carriage, and continues for a short time after it has arrived at the end of a stretch, or greatest distance from the drawing or delivering rollers; and as soon as the spinning action has ceased, it is required to reverse the rotation of the spindles, for the purpose of unwinding or "backing off" the accumulation of spiral coils, which arrange themselves on the bare part of the spindles during the spinning. These spiral coils will be seen at *a*, *a*, *a*, figs. 29, 30, and 31.

At the same time that this backing off is proceeding, the faller wire is depressed, for the purpose of carrying the yarn or thread to the lower part of the spindle, where it is subsequently wound on in the form of what is called the cop during the putting up or going in of the carriage.

A cop of yarn, which is the object of this machine to construct, is generally built on the bare spindle, and consists of a succession of layers or windings on of yarn, placed in a conical form; one of which is added to the cop at every going in, or putting up, of the carriage: the finished cop and spindle being represented at fig. 31.

Thus the amount of yarn or thread spun or completed during the spinning action, and coming out of the carriage, is wound on the surface of the cop during the going in or putting up of the carriage. To effect which, the following four movements are required:—First, "the backing off;" second, the putting down and guiding the faller; third, the putting up or taking

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in the carriage; and, fourth, the winding on of the amount of yarn which had been spun during the preceding stretch.

We shall now proceed to describe, with reference to the annexed drawings, the manner in which we effect these four movements, at the various periods of time when they are required for the proper action of the machine, always considering the reader to be acquainted with the ordinary machine, to which our improvements are to be applied.

Fig. 32, represents a side elevation of part of an ordinary mule, to which our improvements are applied, some of the ordinary gearing being delineated, for the purpose of making the application of our invention better understood: A, is a section of the drawing rollers; and the dotted line A^1, indicates the direction of the yarn or thread to the point of the spindle during the spinning: A^2, is the carriage, which is shown as at the end of a stretch, or the greatest distance from the drawing rollers great A. Thus, supposing the spinning action to have ceased, the "backing off" would be the next movement required.

The stopping of the spinning action of the machine is not effected by traversing the strap from a fast to a loose pulley, as in ordinary mules, but by liberating or elevating the interior of a conical coupling box B, seen best in figs. 33, and 34, the exterior part being marked B^1, B^2, is the driving shaft of the machine; and B^3, the strap by which it is driven.

The worm B^4, which is placed on the driving shaft in the ordinary manner, for the purpose of bringing what is called the second speed into action, drives the worm wheel B^5, on the axis of which is placed a wiper or tappit B^6, as best seen in a side view of this part at

fig. 8, in such position, that as soon as the shaft B^2, has made a certain amount of revolutions, and the spinning is required to cease, it comes into contact with a small projection B^7, from the lever B^8; see fig. 35. The elevating of this lever B^8, carries along with it a perpendicular rod B^9, and the interior of the conical coupling B^{10}, which ceases the spinning; the drum band, by which the spinning is effected, passing round the pulley C, to which the lower part of the coupling B, and the spin wheel C, are connected.

After the coupling boxes B, and B^1, are liberated, and the spinning has ceased, the lever B_8, continues to rise by the action of the tappit B^6, and carrying along with it the connecting rod D, and the lever D_1, liberates the weighted lever D^2, which immediately forces the vibrating shaft D^3, and pinion D^4, into gear with the wheel C^1. Now, by tracing the rotation of the driving shaft, which is indicated by the arrow at B^3, it will be seen that a reverse motion is conveyed to the wheel C, through the train of wheels D^5, D^6, D^7, D^8, to the pinion D^4; and the rim or pulley C, which carries the drum band, being a part of the wheel C^1, the spindles are reversed, and the backing off is effected; the putting down of the faller, which is required to proceed at the same time as the "backing off," will be best seen by reference to fig. 32, in which E, represents a pulley, supported on an upright shaft in the carriage, round which the drum band E^2, is passed, for the purpose of driving the spindles, by means of a similar pulley E^1.

On the under surface of E^1, is placed a catch, which takes into a face ratchet E^3, when the backing off or reverse motion of the drum bands takes place, but runs free of the ratchet E^3, when the spinning is proceeding.

Below, and attached to the ratchet E^3, is a pinion gear-

ing into the rack E^4. This pinion and the ratchet E^3, being both loose on the upright shaft, remain in the position seen in the drawing during the spinning; but as soon as the backing off commences, the reverse rotation of the pulley E, forces the rack E^4, in the direction of the arrow over the centre of the faller shaft, it forces down the faller to the point required.

The amount of depression which it is required that the faller should make in decreasing, in every succeeding stretch, will more clearly appear by reference to fig. 31, where the oblique line indicates the various windings on at each successive going in of the carriage. This decrease of depression of the faller is effected by the position of the inclined bar F, seen in fig. 36, which represents a back view of the carriage to which this movement is attached; F, is a small arm, projecting from the faller shaft, which rests on the inclined piece F, when the faller is depressed; and in the position shown at fig. 36, the faller is supposed to be at its greatest depression, or at the commencement of the building of a cop, as seen at fig. 29: F, represents a ratchet wheel, which is geered by a decreasing speed to the screw F^3: on this screw is placed the nut F^4, carrying the inclined piece F, in the direction of the arrow, and also allowing it a perpendicular vibration on the centre F^5.

On referring to fig. 32, it will be seen that the same motion of the bell crank E^5, gathers a tooth in the ratchet wheel F^1, which, carrying the inclined piece F, in the direction already described, presents a more elevated part of the inclined piece F, to arrest the fall of the lever F^2, and thereby decreases the depression of the faller wire at every stretch, as is required.

During the going in of the carriage, the position of

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the faller is varied, for the purpose of distributing the yarn over the various circumferences of the cop, and by lashing it, as it is termed, tying or binding it firmer together. This is effected by the form of the circular face plate F^6, as seen at fig. 32; the upper surface of which being of a varied elevation, vibrates the lever F, which moves on its fulcrum at F. This lever F, supports the inclined piece F, as seen at fig. 36; and by the up-and-down motion conveyed to the lever F^2, effects the lashing, as it is termed, during the going in of the carriage.

As soon as the carriage has arrived at the front roller, it is required to move the faller to the back of the spindles, that the spinning may recommence; which is effected by the stud G, coming in contact with another projection C^1, from the faller shaft, which, by its curved form, vibrates the tumbler weights E^7, over the centre of the back of the faller shaft, which immediately elevates the faller wire free of the spindles. At the same time, the stud G^2, comes in contact with the tail end of the lever F^7, and raising it free of the face plate F^6; and it is supported free of the face plate upon the short arm of the lever G^3, during the spinning; but as soon as the carriage arrives at the end of the stretch, the lever G^3, is elevated by the bell crank E^5, and the lever F^7, is again liberated to rest upon the face plate F, and recommences its action during the next coming in of the carriage.

As soon as the tappit B^6, see fig. 35, has passed the stud B^7, on the lever B^8, and it has resumed its former position by means of the weight B^{10} (see fig. 33), it also carries the weighted lever D^2, and vibrates the shaft D^3, and pinion D^4, out of gear with the wheel C^1, at the same time that it brings the wheels H, and H^1, into gear

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with each other, which, imparting motion to the pinion H^2, carries the large wheel H^3, in the direction of the arrow.

On one of the arms of the wheel H^3, is placed a connecting shaft H^4, the opposite extremity of which is connected with the carriage at H^5, so that the half rotation which is imparted to the wheel H^3, by the pinion H^2, brings in the carriage, which motion is terminated by the small projection H^6, striking (see fig. 32,) against the lever H^7, and liberating a notched bolt H^8, which had held the pinion H^2, in gear with the wheel H^3, up to that period.

The opposite extremity of the lever H^7, (see fig. 33,) which had held the perpendicular rod B, and the interior of the conical coupling B^{19}, disconnected up to this period, is also relieved, and falling into the exterior part B, the spinning actions of the rim C, is recommended. Referring to fig. 32, the construction of this part of the apparatus will be more clearly seen, where the notched bolt H^8, is shown with the perpendicular lever and weight H^{10}, which are connected to the lever H^7, by a small horizontal rod, as seen in the drawing.

At I, is a counterweight, for the purpose of disconnecting the pinion H^2, out of gear with the wheel H^3, as soon as the carriage has arrived at the front rollers, and the bolt H^8, is removed. The advantages of this method of bringing in the carriage consists in its great similarity to the putting up the same by hand, inasmuch as it is slowest at the beginning and termination of the traverse, as is the case in all crank motions, which this resembles.

The fourth and last motion, which is the winding on, isrequired to vary in velocity at every successive tra-

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verse or going in of the carriage; or, in other words, the winding on of the yarn to the bare spindle, as shown at fig. 29, will require a greater number of revolutions of the spindle than will be required, when the circumference of the cop has increased to its greatest dimension, as shown at fig. 30, which is called the cop bottom; but as soon as the cop bottom is formed, every succeeding layer, to the completion of the cop, will require the same number of revolutions of the spindle.

By tracing the course of the drum band E^2, in fig. 32, it will be seen to pass from the carriage to pulley K, fixed on an upright shaft, which revolves during the spinning action of the machine; but as soon as the spinning ceases, by the disconnexion of the conical coupling B^{19}, and B, and the carriage commences its traverse towards the front rollers, the same wheel H^3, which takes in the carriage, also carries along with it the band K^1: this band passing round the loose pulley K_2, on the same shaft as the pulley K, carries K^2, along with it, by means of the catch and the face ratchet, as seen in the drawing; this ratchet being fast upon the shaft along with the pulley K.

Referring to fig. 34, it will be seen that the two extremities of the band K, are attached to racks, the position of which can be varied by the motion of the pinion into which they gear, as seen at fig. 33, and in dotted lines at fig. 34. Attached to this pinion is a spur wheel, geering into another pinion, for the purpose of modifying its speed to a very slow motion.

This train of wheels is put in motion by the catch L, gathering a tooth in the ratchet attached to the last pinion at every semi-revolution of the wheel H^3. Thus, at the commencement of the building of a cop, and when the spindles are required to move at their greatest

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velocity, the two racks, to which the band K^1, is attached, are run out to their greatest distance from the centre of the wheel H^3, and the greatest amount of motion is imparted to the band K, and consequently the revolution of the spindles are at their greatest velocity; but as every semi-revolution of the wheel H^3, gathers a tooth in the ratchet, which actuates the train of wheels for drawing the racks inwards, by means of a pinion, into which they geer, the distance from the centre H^3, to the points at which the band K^1, is attached to the racks is decreased, and less motion imparted to the band K^1, and thereby the velocity of the spindle is lessened, which is required. This uniform decrease of the speed of the spindles is required at every stretch of winding on until the cop bottom is formed, at which period the catch L, must be put back, and not allowed to vary the position of the rack any further till the cop is complete.

It will be observed that the carriage is provided with the usual under faller wire, which takes up the slack of the yarn, when the winding on is not sufficiently quick for the motion of the carriage; but as soon as the cop bottom is formed, the traverse of the upper faller wire is so arranged by the form of the face plate F^6, that although there may be at some period of the going in of the carriage slack yarn, to be taken up by the under faller, the whole and exact quantity is wound on and disposed of when the carriage arrives at the front rollers.

Having described our certain improvements in roving and spinning cotton, and other fibrous materials, in their application to the mule, for the purpose of rendering that machine self-acting, we hereby declare that we do not claim any distinct, or separate, or well known

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parts of such machinery; but we do claim such combinations of parts as have hereinbefore been delineated and described, for effecting the four movements in that machine, called the backing off, the putting down and guiding the faller, the putting up or taking in of the carriage, and the winding on or distributing the yarn in the form of a cop at every successive stretch.—[*Inrolled in the Rolls Chapel Office, June,* 1834.]

Specification drawn by Mr. Nicholson.

To BARTHOLOMEW REDFERN, *of Birmingham, in the county of Warwick, gun-maker, for his having invented or found out a lock, break-off, and trigger, upon a new and improved principle, for fowling-pieces, muskets, rifles, pistols, and small fire-arms of all descriptions.*— [Sealed 17th December, 1830.]

THE principal object of the Patentee appears to be the construction of a lock for small fire-arms, which shall not be capable of being discharged by accident. The construction of the lock is not intended to be materially altered from the ordinary arrangement of mechanism applied to that purpose, but the application of pressure to the sear spring, by which the piece is to be discharged, is proposed to be, through the agency of a plug, depressed by the thumb, instead of the force of the finger exerted against the trigger.

In Plate VII., fig. 16, represents a fowling-piece, partly in section, for the purpose of showing the lock, and the improved parts appended thereto. It will be unnecessary to describe the several parts of the lock,

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as they will be perceived and understood; but it may be necessary to say, that the sear spring is represented at *a*.

The sear spring is not, however, in this construction of lock connected to the trigger, as in other locks; it is attached by a double-jointed piece to a lever *b*, which lever turns upon a fulcrum pin in its centre. At the reverse end of this lever an arm extends forward, like the arm from an ordinary sear spring, upon which arm the lower end of the plug *c*, is intended to bear; and when this plug is depressed by the thumb of the sportsman bearing upon it, that end of the lever *b*, will be forced downward, and of consequence the reverse end of the lever be raised, which draws up the end of the sear spring, and allows the piece to go off.

For the sake of protection, the head of the plug *c*, is covered by a moveable cap *d*, forming part of a slider *e*, which moves to and fro in a groove in the stock, behind the breech-end of the barrel: this slider *e*, is acted upon by the trigger, through levers, which might be attached to the other side of the lock plate; but are not shown in this figure, to avoid confusion.

When the piece is brought to the shoulder for firing, the fore finger must be applied as usual to the trigger; but merely for the purpose of drawing back the slider *e*, and uncovering the head of the plug: when this is done, the thumb is to be pressed upon the head of the plug, which will discharge the piece in the way explained above; and a spring, bearing against the lever of the slider *e*, will, when the finger is withdrawn from the trigger, send the slider forward again, and cover the head of the plug, as shown.—[*Inrolled in the Inrolment Office, June,* 1831.]

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To Henry Pinkus, *of North-crescent, Bedford-square, gentleman, for his invention of an improved method of, or apparatus for, communicating and transmitting, or extending motive power, by means whereof carriages or waggons may be propelled on railways or common roads, and vessels may be propelled onc anals.*—[Sealed 1st March, 1834.]

The subject of this patent is a mode of impelling carriages on railways by pneumatic pressure, that is, by the pressure of the atmosphere acting against a piston within an extended cylinder, the cylinder on the reverse side of the piston being in a state of partial vacuum. From the frame or carriage to which this piston is attached, an arm extends upwards, passing through a longitudinal slit or opening in the top part of the cylinder; and to this arm the first of a train of carriages is attached, the train running upon a railway on the outside of the cylinder. In this way the piston within the cylinder, and the carriages on the outside being connected together, the progress of the piston, by pneumatic pressure within, is intended to conduct the train of carriages on the outside forward, the aperture in the cylinder before the piston being, as the carriages advance, closed air-tight by a flexible cord, in order to afford the means of producing a partial vacuum within the cylinder before the piston, by the application of an exhausting apparatus.

As this subject is assuming rather an important position before the public, by the creation of a joint-stock company, proposing to send carriages to all parts of the kingdom, by means of pneumatic railways, we have considered it desirable that the Patentee (though he

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has given us rather a lengthy specification) should speak for himself, in preference to any condensed version of the matter, which we might have otherwise thought fit to have laid before our readers.

The Patentee says — My improved method consists in the application of a well-known principle in pneumatics to, and in combination with, a new apparatus, or new and improved combination of apparatus and machinery, whereby motive power can be generated, and great velocity may be acquired; with which application and combination aforesaid, I construct what I denominate the pneumatic railway.

The principle that I apply is that of the action obtained by means of a partial vacuum by rarefying, or partially exhausting, the atmosphere contained in an extended funnel, tube, pipe, or conduit, having a transmitting and accelerating piston, impelled by the ordinary weight or pressure and elasticity of the atmosphere. This action I effect by the operation of air pumps, worked at stations along, and near to, the line of road, by fixed steam-engines, or stationary engines of any other kind, which may be made advantageously available as first movers.

My method of communicating motive power to cars, carriages, or other moveable bodies, consists in transferring the action generated or produced in the interior of a tunnel, tube, conduit, or pipe, to its exterior, by connecting a vehicle or machine situated within the tube, with the car or carriage without. This vehicle or machine I denominate the dynamic traveller; and the car I denominate the governor.

My method of transmitting or extending motive power consists in the propulsion, which I effect by means of the combination aforesaid, whereby cars, car-

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riages, and other moveable bodies, may be transferred on railways, or rail-roads; and vessels may be transferred on canals, by uniting the before-mentioned combination with the common well-known system of railways, or with a canal.

The combination before mentioned is, however, itself a complete system of railway, when not united with the common system of railway; and this system, together and in connexion with the application of the pneumatic principle, by means of the combined apparatus referred to, forms the more particular subject of the following specification, in which the same letters of reference apply to all the diagrams and figures (see Plate IX.).

I construct a tunnel, tube, conduit, or pipe of cast iron, or of any other suitable material, either cylindrical, or of any other convenient form, and of any required diameter, dimension, or capacity, according to the nature of its application, whether it be with a view to the formation of a complete system of railway in itself, as here more particularly proposed, or whether it be with a view to the application of the pneumatic power to, or in union with, a common railway; or to, or in union with, a canal.

In constructing the pneumatic railway, I propose to make a cylindrical tunnel of about forty inches internal diameter, and of the average thickness of about one inch; that is to say, the lower half of its circumference about seven-eighths of an inch, and the upper half three quarters of an inch. If any other kind of materials be used, the substance will necessarily depend on the nature of such materials.

The length of the pneumatic tube will be equal to the whole length of the railway, or canal, to which it

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may be applied, as the medium of a transferring motive power. The cylinders composing the pneumatic tube should be cast in portions of the greatest lengths possible, on smooth metal moulds, so that their inner sides present surfaces perfectly even and true. The ends of the cylinders should be connected by means of the common socket joint; for which purpose a ring or socket should be cast on one end of each cylinder, projecting so as to form a socket to receive the plain end of another cylinder, to be connected with it.

Fig. 1, is an elevation of the pneumatic railway, with the governor attached. Fig. 2, is a longitudinal section of the same, taken upon and a little on one side of the medial line, exhibiting the dynamic traveller within, and the governor to which it is to be attached without, and showing their connexion with each other, by means of an arm passing from the former through a continued longitudinal chase, or lateral perforation in the tube of the railway, into the latter.

Fig. 3, is a plan of the pneumatic railway, with that of the governor drawn upon it; the dotted lines in the latter indicating those parts which are beneath its floor or bottom and projecting ends.

Fig. 4, is a transverse section of the pneumatic railway when properly constructed, and exhibiting an end elevation of the governor, its several connexions, and its position; and also the rear wheel of the dynamic traveller, and its position within the pneumatic tube, together with its piston in advance Fig. 5, is a transverse section of the pneumatic railway, as at fig. 4, through the body of the governor, and through the crutch of the dynamic traveller, with the vertical arm passing from the one to the other, to show more clearly the connexion established by it.

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Fig. 6, A, is a transverse section of a station valve in the pneumatic tube, by means of which the operation of rarefaction may be confined to a particular section of the pneumatic cylinder, and be recommenced after it has been discharged by the passing of the dynamic traveller, in preparation for the train that shall next follow: B, is a section longitudinally of the pneumatic tube, and transversely of the valve, for the further illustration of the mode of suspending the valve: C, is a plan of the valve frame. Fig. 7, is a transverse section, on a larger scale, of the pneumatic valve and the valvular cord; by means whereof the power generated in the interior of the pneumatic cylinder is retained until the advance of the dynamic traveller, and its attached apparatus effects its application and transference to the exterior, or outer side, of the said cylinder.

Fig. 8, is a transverse section of a common rail-road, with the pneumatic tube applied in a transverse section; also with an end elevation of the car, for the further illustration of the governor and dynamic traveller.

In constructing the hollow cylinders, of which the pneumatic tube *a*, *a*, *a*, *a*, figs. 1, to 8, is composed, I form on one side of such cylinder, which will be its upper surface when laid in its proper position, a pneumatic valve *b*, *b*, having the appearance of a trough, or deep groove, whose central line will be in a line with one passing through the vertical diameter of the cylinder. This valve is composed of the same metal as the pneumatic tube, and is a part of the same casting. The sides of the trough or groove *c*, *c*, should be about seven-eighths of an inch thick, and about four inches high; and on the upper edge of these sides are projections *d*, *d*, figs. 4, and 7, one and a half inches wide by one inch thick.

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The inner side of this trough is of parallel form, having angular grooves in the bottom, with square-shaped edges, as shown in fig. 7, at *e*, *e*; and these edges, on the other side from the angular grooves, form the borders of a continued slit or chase, cut through the bottom of the trough into the body of the tunnel.

The trough or groove on the inner side from the top of the edge *e*, *e*, of the vertical sides of the chase to the top of the sides *d*, *d*, should be about four inches deep, and the distance between the opposite sides four inches; and the arrangement generally is such, that a square cord, whose dimension is four inches, when laid in the trough, shall press against the sides of the trough.

Through the lower part of the trough or groove, whose length is equal to the whole length of the pneumatic tube, I form the longitudinal slit, chase, or continued aperture *f*, figs. 3, and 7, above referred to, into the pneumatic cylinder, and along its entire length. On the two opposite sides of the pneumatic tube or cylinder, and in a line with a line drawn horizontally through its diameter, being a part of the same casting, are the rails *g*, *g*, figs. 1, 3, 4, 5, and 6, of the form shown in fig. 4. These rails are three inches wide on their upper and horizontal faces, clear of the socket rings, and two inches deep on their sides vertically; and thence gradually diminishing downwards to a depth of six inches in a curve, as shown in fig. 4.

On the inner and lowest side of the cylinder, and in a line with a vertical line drawn through its diameter, and vertically under the slit or chase *f*, is a raised and vertical tongue, or rail, *h*, figs. 2, 4, 5, 6, and 8, four inches high, being two inches in width or thickness at its base, and gradually diminishing to one inch at top,

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and three and a half inches high, above which it is semicircularly convex. This tongue, or rail, is also a part of the same casting with the pneumatic cylinder. Under the rails *g*, *g*, at about eight inches below their upper and horizontal surface, are brackets *j*, *j*, figs. 4, and 5; one pair near to each end of every length of the cylinder, and cast with the cylinders themselves, as the rails are; and these brackets may be about four inches thick, and may project four inches, and each must be bored to admit wrought iron rods *j*, *j*, one inch thick, to pass through them; and these rods are to be connected at their ends by nuts and screws, for the purpose of firmly connecting the cylinders along the whole length in which they may be laid.

It may be observed, that the rails *g*, *g*, and the tongue or rail *h*, may be either cast with the cylinders, or be made of wrought iron and put on, and fixed in any convenient manner; or case-hardened plates may be laid on and fixed to the upper surfaces of the rails *g*, *g*. The ends of the rails *g*, *g*, should be bored to receive wrought-iron dowels about three quarters of an inch in diameter, and six inches long; since these will conduce to the firmness of the cylinders and rails, and will tend to keep them in a true line, and thus prevent shocks, such as usually occur on common rail-roads, in consequence of the deflection of the rails, by the passage over them of heavy bodies and of carriages in rapid motion.

Preparatory to the laying down or constructing a line of the pneumatic railway, the necessary approximation to a level, and the drainage having been procured and effected along the line of the intended road, I propose to make a foundation in the following manner:—I form a semi-circular trench, large enough to

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receive the lower half of the cylinder, and admit of the following arrangement. Within the trench may be laid a ballasting of broken stones, or a partial bottoming of rough, close set, pitching stones, may be formed, as seen in fig. 4; the stones being set with their broadest ends downwards, and over them a coating of broken stones should be laid in the manner now usually practised in forming common roads. This foundation or bottoming may be made continuous, or be laid only at intervals, as the nature of the soil may permit or render it necessary.

In the trench thus prepared, the cylinders should be placed end to end, and flexible rings for packing applied to the grooves in their ends; and by the application of wrought-iron rods, with their nuts and screws, the ends of the cylinders will be bolted firmly together, and the joints made air-tight.

The trench should then be filled in with rubble, well rammed down, and a rough rubble curb beset along under the rails *g*, *g*, as indicated in the diagram, fig. 4, leaving them clear above the surface, as in the elevation, fig. 1.

With a view to facilitate the operation of transit, and enable various parts of the same line of the pneumatic tunnel to be used simultaneously, I propose to divide it into sections (of convenient lengths, which may be determined by the stations of the operating engines), by intercepting station valves, which may be constructed and arranged, as shown at fig. 6, A, B, C, or be made similar in form and construction to the common gas valves usually applied to gas mains; and the connexion may, in this case also, be similar.

The action of the station valve is, however, necessarily much quicker than that of the gas valve, working

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more loosely and freely in its frame, by means of chains and pulleys, instead of the screw. The station valve, as here proposed, may be compared in construction, action, and in the mode of suspending it to a common sash and frame, with a sill and pulley styles, but with an open head; the styles and linings being fitted up to the sides of the cylinder, and running down into a chamber, constructed under the line of road. The frame of the valve and its shutter may be of any convenient material of sufficient strength.

The upper half of the sliding shutter *q*, is semicircular, to conform to the shape of the upper side of the pneumatic cylinder; the lower part being made parallel and square, to run between the styles, and fall down upon the sill. The sliding valve may be suspended by chains fixed by their ends within grooves on its edges, and running over pulleys in the styles of the frame. These chains may be conducted from the pulleys to a windlass, which may be turned by a winch, and the sliding valve be thus raised or lowered, either to open or to intercept the communication between the several sections of the pneumatic tunnel by a single turn of the winch.

In the diagram A, is a transverse section of the pneumatic cylinder, with an elevation of the frame and sliding valve in the supposed chamber beneath it, and showing the valve or slide drawn up to intercept communication: B, is a longitudinal section of the tunnel, and a transverse section of the frame and valve; and C, is a plan, showing the arrangement of the pulley styles, and the rabbets and grooves for the slider, or valve, and enclosing doors. Fig. 5, is a transverse section of the tube or tunnel, as at fig. 4, transversely through the body of the governor, and through the

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crutch of the dynamic traveller, showing the vertical arm at its insertion into the latter, passing through the chase and through the pneumatic valve, and into the chase or aperture in the floor of the governor, with the mode of attaching it to the latter, as further exhibited and elucidated in the plan, fig. 3; and also showing the friction wheels *r*, *r*, exclusively attached to the arm, as suspended from horizontal bearers, to prevent its sides from coming into contact with the sides of the chase of the pneumatic valve. In this diagram, as in fig. 4, the piston is seen in advance of the dynamic traveller within the body of the tube or tunnel *a*, *a*, *a*, *a*.

The pneumatic railway being thus constructed, I place the before-mentioned dynamic traveller L, fig. 2, upon the tongue or rail *h*, within the body of the cylinder. This vehicle is the bearer of a transmitting piston *l*, *l*, and is constructed of two iron wheels *m*, *m*, each three feet four inches in diameter, having case-hardened peripheries, in which are grooves three inches deep, conforming to the shape of the vertical tongue or rail *h*. These wheels are mounted in and attached to a crutch or duplex beam *n*, *n*, by their axles, which are placed each in a direct line with the other, after the manner of a common velocipede, and run in a line on the vertical rail *h*, as shown in fig. 2.

Connected with the crutch or duplex beam aforesaid, and at about midway between the two wheels is a vertical wrought-iron arm *p*, inserted by means of a tenon into the duplex beam, and passed through the continued chase or aperture. This flat vertical arm protrudes, or projects, through the slit, chase, or aperture, made through the upper side of the pneumatic cylinder before mentioned, and through the trough or

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groove, as seen at figs. 4, and 8, and more clearly at fig. 5. The top of the vertical arm projects into a wide mortice in the bottom of the before-mentioned governor, to which it is attached and confined, by a bolt or pin, as indicated at figs. 2, 3, and 5, and thus connects the governor with the dynamic traveller.

Attached to the vertical arm are inflexible horizontal arms, from which are suspended by pivots or vertical axles friction wheels *c*, *c*, as seen in fig. 5, and also in the figures 1, and 3, whose peripheries roll on the outer sides of the before-mentioned pneumatic trough, fig. 7. These wheels guide the vertical arm in its passage along the slit or chase *f*, before mentioned, and prevent its touching on either side.

To the advanced end of the crutch or duplex beam, and exactly in the same line with it, is attached a wrought-iron rod s, fig. 2, of any convenient length; and this rod should be so stout as not to deflect with the weight of the piston *l*, which is firmly secured to its further end in a transverse position. The piston itself must be a stout and inflexible frame, of any sufficiently strong material, and be covered with a metal plate, to secure its efficiency.

It is proposed to form a valve in the lower quadrant of this piston, as indicated at *o*. Figs. 2, 4, 5, and 8, hung upon pivots, and acted upon by a chain *t*, *t*, *t*: fig. 2, passing over the pulleys *u*, *u*, *u*, and led, by any convenient arrangement, up into the governor. The object of this valve is to assist in retarding, or entirely stopping, the onward progress of the vehicle when it may be necessary.

The lower part of the piston, and consequently this valve, must be notched to the form of the vertical

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tongue or rail *h*; and the piston generally must be so much less than the transverse section of the pneumatic cylinder, as to pass freely through it.

On the outer side of the pneumatic railway, and across it, is placed the before-mentioned car v, with its wheels resting on the rails *g*, *g*. To the body of this car, which may be of ordinary form, but open at both ends, are attached the four wheels *w*, *w*; each of which is made six feet in diameter, and two inches thick on the tire, or at the periphery. The tire bearings and axles of these should all be case-hardened.

The axles *x*, *x*, upon which the wheels *w*, *w*, are placed, are made with cranks, to bring the body of the car down to the most convenient height; but axles of any other convenient form may be applied. The length of the axles must be such as to allow one inch play between the inner faces or sides of the wheels, and the socket rings on the sides of the pneumatic cylinder.

To the axles of the governor I attach flat metal tongues of the form shown at *y*, *y*, plan, fig. 3, projecting forward. To the advanced ends of these tongues, are affixed friction wheels *z*, *z*, suspended horizontally by pivots or vertical axles. These wheels are made of metal; and the suspending pivot or axle should be of such a length as to bring the friction wheels to bear upon the middle part of the sides of the pneumatic trough or valve *b*, *b*, and go in under the projections *d*, *d*.

The pivots or axles are placed in slits, made in the ends of the tongues *y*, *y*, five inches long and two inches wide, against which are placed strong spiral springs, which cause them to slide inwards, and press the peripheries of the friction wheels against the sides *b*, *b*, of the trough. The play which these springs allow

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the friction wheels should be so regulated, as to prevent the wheels of the governor from rubbing or coming in contact with the sides of the pneumatic cylinder, notwithstanding any curves that may occur in the line of the railway.

The projecting tongues and the springs thereto attached should be so adjusted, as to prevent the peripheries of the friction wheels from getting from under the projections *d*, *d*. Similar friction wheels must be attached to all the cars or carriages used upon the pneumatic railway, their use being to prevent the carriage wheels from coming in contact with the sides of the cylinder.

Within the body of the governor is suspended, in manner shown in figs. 2, 4, and 8, a light wooden wheel, having a concave groove in its periphery. Projecting from the front of the governor, in a line with the wheel P, is suspended immediately over the valvular cord, and about two inches above the rim of the pneumatic trough, a light wooden wheel C, as shown. A flexible cord E, lies in the groove at top of the cylinder, for the purpose of closing the longitudinal aperture. This cord is to be of the same length as the pneumatic railway, and to fit tightly into the groove or channel. The cord is passed under the wheel C, and over the wheel P; and its purpose being to close the opening in the cylinder, it is required to yield freely when acted upon by the apparatus, and it should be made heavy, and it may be pressed down into the groove by the wheel W, which passes over it.

The pneumatic railway being constructed and laid down as described, I propose to erect, in any convenient situation near to the line of the road, stationary exhausting engines, or air pumps, to be put in action

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by attached local steam-engines, or engines of any other suitable kind in power as first movers. The exhausting engines are to be connected with the pneumatic tube, to which the railway is attached by means of lateral tubes or pipes, of any required diameter, according to the power of their engines, their distance from the line of the road, and the degree of rarefaction required.

These tubes are to form a free communication from the exhausting engine to the interior of the pneumatic tube of the railway; and the connexion made in the common manner upon the lower side of the tube, at the distance of about two hundred feet from the station valve before described, and on the side of it that lies nearest to the station whence the governor, with its train of carriages, is to be drawn.

I propose to arrange the stations for the engines on the line of railway, or canal, at several miles apart, or at any other convenient or suitable distance; which circumstances may show to be necessary, consequent upon the power of the engines, the capacity of the pneumatic cylinder, the degree of rarefaction necessary, the average weight to be conveyed, the velocity required, and the height of any inclined plane to be surmounted.

Similar considerations affect the apportioning of exhausting power upon the application of the pneumatic cylinder to common railroads, or to canals. The power of the respective stationary engines, with reference to the effect they may be required to produce, will determine the distance they may be apart, under any circumstances, or rather their powers must be apportioned to the various circumstances; and it will be a matter of economy to determine whether the effect required

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may be better produced by engines of great power at longer distances, or by engines of smaller power at shorter.

On a double line of railway, each stationary engine should be connected on opposite sides of the station valves, with both lines of the pneumatic cylinder, and consequently with two sections; and may thus be made available to operate alternately or simultaneously upon both sections, and effect transit in both and opposite directions.

As the power to be produced is by the pressure of the atmosphere acting against the piston, in advance of the dynamic traveller, by the rarefaction within the tube before it, the pressure will depend upon the degree of rarefaction; and that may be constantly ascertained by means of barometers placed at the different stations, which will indicate the approach of the governor and its train, and about its distance from the station.

A barometer, placed on the governor, and communicating by a small tube with the interior of the pneumatic cylinder, and through the piston to its vacuum side, will likewise indicate the degree of rarefaction, and consequently the pressure upon the piston, the sufficiency of power to propel, and the time for moving off.

When it is desired to put the pneumatic railway into operation, its several parts being properly adjusted, motion must be given to the stationary exhausting engine connected with the section of the tube, through which propulsion is to be effected. The station valve being closed, and the air abstracted from that end of the section of the pneumatic cylinder, rarefaction will take place throughout the whole of the included atmosphere contained in the space lying between the station

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valve and the piston, which is attached to the dynamic traveller. The partial vacuum thus effected at the station will cause the included column of air to move rapidly towards it; and the incumbent atmosphere, pressing upon the valvular cord, will tend to aid the weight of the cord in making the pneumatic valve sufficiently close to prevent the ingress of the external air, and preserve the required degree of rarefaction on the vacuum side of the piston.

The unincluded atmosphere rushing into the cylinder through the aperture in the pneumatic valve over the dynamic traveller, which is laid open by the raising or lifting of the valvular cord over the wheel P, of the governor, and impinging on the plenum side of the piston, will produce a pressure proportional to the degree of rarefaction on its opposite side.

The piston (being situated and moving always in advance of the wheel C, of the governor, whose office it is to roll on the valvular cord, and prevent it from rising until the piston has passed, if the weight of the cord shall not effect that object,) will consequently move forward, and draw with it the dynamic traveller, which, being attached to the governor by the vertical arm passing through the before-mentioned chase, or continuous aperture, will communicate to it the impelling power thus produced, and applied by its agency to the train of waggons or carriages therewith connected.

As the governor moves forward, according to the mechanical arrangement, the wheel P, will roll under the valvular cord, and continue to raise it up on the plenum side of the piston, and on that side of the vertical arm nearest to the piston, and lay it down into the pneumatic trough under the wheel W, on its opposite side, or in the rear; forming at all times, during the

advance of the dynamic traveller, a clear opening for the passage of the vertical arm, and for the admission of the external impelling atmosphere.

When the stationary exhausting engine has produced such a degree of rarefaction as to induce a sufficient pressure on the piston to propel the train with the required velocity, and which the barometer attached to the governor will indicate, the engine continuing or keeping up the required degree of rarefaction, the governor and its train will be impelled onwards towards the station valve, which, on the near approach of the dynamic traveller, must be quickly let down, so as to permit it to pass. The valve may then be again raised, and the same engine continuing to abstract the air as before from the same section of the railway, it will be again soon prepared for another train in like manner.

When the dynamic traveller has passed the station valve, and entered another section which has been similarly prepared by the operation of the engine next in advance, it will be impelled forward in like manner through that section, and so on from one section to another throughout the whole line of railway.

In order to apply the pneumatic tube to the propulsion of boats on canals, it will only be necessary to lay down a line of tube on, or along, the whole length of the margin, or what is usually termed the towing path of the canal. The construction and dimensions of the tube, and the various apparatus therewith connected, including the stationary engines, station valves, &c., may be alike in all their parts to a line of the pneumatic tube, when applied as the medium of a transferring motive power to a common railroad, as shown in a transverse section at fig. 8. The towing line of the canal boat must be attached either to a governor or to

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the vertical arm itself of the dynamic traveller; station valves should be placed at the locks of the canal.

Now, although my application, invention, or discovery, hereinbefore related and specified, will admit of various forms and dimensions of the apparatus and machinery, and of their parts in detail, as well as the use of other and different materials from those mentioned, I claim the combination and arrangement hereinbefore set forth and described. I claim the cylindrical tube or tunnel, with its various attachments and lateral perforation; that is to say, the attached or upraised sides on the upper and outer surface of the tube, with its external and internal arrangements, forming the trough or groove of what I term the pneumatic valve, together with the perforation chase, or continued longitudinal aperture between those sides and through the side of the tube, and the attached projecting rails outside upon the sides, and under the horizontal diameter of the cylinder; and also the vertical tongue or rail, which is vertically under the chase of the pneumatic valve. I claim the application and combination of what I term the station valve, with the pneumatic tube: I claim the combination of the apparatus or machine, which I term the dynamic traveller, within the laterally perforated cylindrical tube or tunnel, with the car or carriage on the outside of the same tube or tunnel; and I claim the vertical arm which is attached to the dynamic traveller within, and which, passing through the perforation chase or aperture of the tube or tunnel, conveys the impulse obtained from the power within to the outside, together with the flexible cord, however constructed, which I call the valvular cord; and its application to, and connexion with, the pneumatic trough or valve, or continued aperture of the tube or

tunnel; and also the application of the wheels P, and C, and W, of the governor, and their use and application in combination with, and application to, the valvular cord, and the method in which they raise and press it, and the action of raising and lowering the cord. I claim the application of the principle by which motive power generated or produced within, or on the interior of an extended or lengthened hollow cylinder, or tube, pipe, or tunnel, is, or may be communicated to the exterior or outer side, and made available upon, or near to, the outside of such tube, pipe, or tunnel, and of transferring the motive power along on the outside, and continuing it along the entire length, or any part of the length, of such tube, pipe, or tunnel, as aforesaid, and by means thereof, of drawing, compelling, impelling, or propelling cars, carriages, or waggons, or vessels, being on the outside, and on or near to the said tube or tunnel, as aforesaid: which said cars, carriages, waggons, or vessels, may be attached to, or connected with, the power produced, as aforesaid, in any convenient manner, whether the connexion between the internal and external parts of the apparatus, and the communication from the former to the latter, be made by means of the vertical arm passing through a pneumatic valve. I claim the application or combination of the pneumatic tube or tunnel, with all or any of its attachments to, or with, a common railroad, by being laid down between the rails as aforesaid, or by the side of such railroad, or to any common road, or to or with a canal, as the medium of communicating and transferring motive power, as aforesaid.

I disclaim being the inventor or discoverer of a pneumatic hollow cylinder or tunnel, designed for the conveyance of persons or goods, or cars, carriages, or

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waggons, on the interior or inner side of such hollow cylinder or tunnel, such method being old and well known; and I disclaim all other things which it has been necessary or convenient for me to mention, and which are not included in the aforesaid claims made by me, as my improved method of, or apparatus for, communicating and transmitting or extending motive power, by means whereof carriages or waggons may be propelled on railways or common roads, and vessels may be propelled on canals.—[*Inrolled in the Rolls Chapel Office, August*, 1834.]

Specification drawn by the Patentee.

ORIGINAL COMMUNICATION.

To the Editor of the London Journal of Arts and Sciences.

London, 26th May, 1835.

Sir,—Understanding that it is your intention to publish the specification of the pneumatic system of railway, and desiring that some of the practical details which are not properly the subject of the specification of my patent should be made known, I solicit a space in your respectable publication for that purpose, deeming the pages of a scientific journal to be the proper medium through which to make such a communication, with a view of answering questions, which, from time to time, have been propounded, regarding the pneumatic railway; and with a view also of disabusing the minds of the uninitiated on the engrossing subject of railways, who are sometimes imposed on by persons deeply interested in the construction and working of railways on the old system; and who—thinking their own *pecuniary* objects attacked by any new proposition which offers to the public the ready means of obviating the necessity of sinking investments of many millions of capital without the possibility of redemption, where profits may not be certain—labour insidiously to condemn what they do not understand, or are too obtuse to comprehend. The necessity of speaking of the defects of the old system, in order to exhibit the advantages of the new, will be obvious; but in doing this I shall endeavour, as much as possible, to reduce my remarks rather to a popular than a technical form.

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It was remarked by a gentleman of high scientific attainments and of the highest authority on the philosophy and practice of railways, on his cross-examination before a Parliamentary Committee, that "the *practical operation of the Liverpool and Manchester Railway has developed disadvantageous circumstances, arising from the locomotive steam-engine, which have come upon the scientific world like a miracle.*"

I am prepared to demonstrate that by *established principles in science,* which are obtained in my projection of the pneumatic system of railway, that the disadvantages and defects in the construction, and the great expense of the practical operation of the old system, can be obviated in future works; they may also be neutralised in those that are formed, and will greatly economise the maintenance of railways. *It is the combination of these principles referred to, and the method of applying them, which constitutes the pneumatic system railway;* in the practicability and efficiency of which I am supported by many of the most eminent men of science in England and Europe, philosophers and mathematicians—and such men are the competent judges of a philosophical application.

It is a fact well known, that the average estimated expense of the formation of railways is 23,000*l. per mile.* Some of the best that have been constructed greatly exceed that amount. This large expenditure does not arise from the mere construction of what is termed the permanent way,—that is, the foundation, the ballasting, the blocks, chairs, and rails—these would not exceed, for a double line, a sum of about 8,000*l.* per mile; but it is the deep cuttings, the tunnels, the high embankments, and the consequent extensive side slopes, and the required quantity of land, which absorb the two-thirds, sometimes three-fourths, of the invested capital of a line of railway. All this is, however, indispensably necessary, in order to procure such gradients or approximations to a level line, as will make available an inefficient machine—the locomotive steam-engine—which, when applied, produces so much destruction to the permanent way, frequently to life, and which is maintained only at a vast expense.

The Liverpool and Manchester Railway cost a sum not far short of 30,000*l.* per mile, exclusive of the tunnel and stations; yet the two stations stand nearly on the same level, and the face of the country is fair for a railway; and the short inclined planes of Rainhill and Sutton, one and a half miles each in length, slopes so slight as scarcely to be perceptible to the naked eye, are the cause of a large proportion of the expenditure of motive power. The loss of interest on capital, whilst the deep cuttings, embankments, and tunnels are forming, is not an unimportant item, which must be added to the expenditure. It was estimated, that such cuttings and embankments, on a

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former proposed railway to Brighton, would have occupied a period of eight years.

I have been informed by Mr. Hargraves, the gentleman who farms the Bolton branch railway, communicating with the Liverpool and Manchester line, and whose engines ply upon that line, that each of his locomotive engines costs for maintenance, including wear and tear, upwards of 2,000*l.* per annum. He informed me that he had eight such engines, and so rapid was their destruction, that he seldom had more than three out of that number in working condition, the rest were always in hospital being repaired; and that great efforts were made to improve them, but, after an experience of three years, his expenditure in that respect had not diminished; and that their maintenance would have proved fatal to his speculation, had not such consequence been prevented by a large increase of business on that branch railway.

It may be seen, by reference to the *Half-yearly* Report of the Directors of the Liverpool and Manchester Railway, ending 30th June, 1834, that the item "Maintenance of Way," was 9,350*l.* 17s. 5d.; a rate of more than 623*l.* per mile per annum.

The permanent way of the common system forms an unconnected chain of comparatively slight links, not having a permanent continuity. This chain is supported on cast-iron chairs fixed on stone blocks three feet apart,—massive blocks, it is true, yet slight, when the action of the engine is considered.

The locomotive steam-engine and its tender weigh from ten to twelve tons, and the gross load of a train is usually about forty-five tons; the load on each wheel may be taken at two and a half tons. When the wheels are between the supports the rails deflect, and their ends are raised and present points with which all the wheels that follow in the train are brought into contact. When the rails, chairs, and blocks, receive concussions, arising from a weight of forty-five tons, with a momentum arising from a velocity of more than twenty miles an hour, the cast-iron chairs are consequently broken, and the stone blocks are not unfrequently split. The great number of broken blocks seen on the side of the Liverpool and Manchester Railway bear evidence of the fact. When a chair or rail is broken, it is replaced sometimes when a quick train is so near as to pass over the newly-placed rail in ten seconds after it is laid down.

The pistons of a locomotive steam-engine impelling a quick train, make about five strokes per second. At each stroke of the piston, or half turn of the crank, the engine receives a lurch from one side to the other of the railway, when the flanges of its wheels, and the wheels of all the train in turn, come in contact with the sides of the rails, striking them violently in their weakest direction: this unsettles the stone blocks, and the concussion of the engine and cars causes them to settle. The rails

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are thus thrown into undulations, and as the wheels pass along and rise over these undulations, a rocking motion is produced on all the carriages, which has a tendency to throw frequently the whole load on only two wheels; this adds greatly to the shocks which the rails, chairs, and blocks, sustain, is so detrimental to the railway, so destructive to the engines and cars, and so dangerous to life. The foundations may be seen bare for many yards in extent; whilst the blocks are being adjusted the train nevertheless passes over at such times, and even on the highest embankments. The great care and watchfulness observed on that railway prevents accidents: whilst timely repairs alone protect life, for in the system there is no protection. On every mile of the Liverpool and Manchester Railway may be seen numbers of workmen repairing the permanent way; and when they are observed more particularly on one side, it is because a heavy train has just passed over, and they are mending the way preparatory to another train coming upon it. Persons travelling in the inside of a railway carriage see little of all this; but if they take an outside seat, near to the locomotive engine, they may at any time observe it. It is not, of course, my purpose to condemn railways, the public know and appreciate their benefits; my object is to point out certain defects of the system,—defects that are not known to the public generally, but are to many interested in railways, *some of whom endeavour to conceal them*; and I state them only in order to show that the pneumatic system cannot be subject to such circumstances.

The pneumatic railway admits of several methods of application, in each of which the dimensions, economy, and details vary. On a line of road where the transit is very great, as for example between Liverpool and Manchester, a double line of the pneumatic railway would be required, the cylinder of which should be thirty-six inches internal diameter, and so moulded as to be of the average thickness of three quarters of an inch; that is, the lower semi-circumference to be three quarters of an inch, and enlarged into a series of rings three feet apart, so as to be about one and a quarter inches thick where the rings occur; thus giving the lower semi-circumference an *average* thickness of seven-eighths of an inch. The upper semi-circumference may be of the average thickness of five-eighths of an inch, when disposed into similar rings.

When the amount of transit on a line of road warrants the construction of a single line of the pneumatic railway to be worked on the reciprocating principle, with sidings and stations for turning at distances varying from fifteen to thirty miles, the cylinder should be moulded in a similar form, and of a like thickness, but of forty inches internal diameter.

Where the pneumatic system is combined with a common railway,—that is, laid between the rails as a medium for trans-

mitting power communicated to carriages running in the usual manner, on rails fixed on blocks,—the cylinder, not having to sustain the weight or action of the loaded carriages, should be of twenty-eight inches internal diameter, and half an inch thick; and when the system is applied to canals, the cylinder should be twenty-two inches diameter, and half an inch thick.

It will be seen, by reference to the diagram, that the pneumatic railway has its *lower semi-circumference* embedded in a trench below the surface level, forming and having the property of an inverted arch, the upper surface of the rails being two or three inches above that level, and forming the shoulders of the arch, which sustains the load. This inverted arch is laid on a permanent foundation that is properly drained.

The rails being raised ledges on the cylinder are three inches on their upper surface, two inches on their sides, and terminate by a curve into the cylinder at a depth of five inches below their surface. The transverse section of that part of the cylinder, which alone form the rails, will have an area of about twice and a half the area of the transverse section of a common railway bar; the latter having a section, the average of which is four and a half inches deep, and one inch thick, except the upper edge, which is two inches broad by one inch thick. The ends of the cylinders are braced firmly together by three-quarter wrought iron rods passing through brackets, the rods laying in a line with a vertical section of that part of the cylinder forming the rail, and at the depth of half the semi-circumference of the cylinder. These rods add greatly to the strength of the railway cylinder in sustaining the weight passing over the shoulders of the arch, —they are as a chord to the segment of a circle, the circle being an arch which cannot deflect unless the chord elongate. If a weight pass over any part of the cylinder, which would have a tendency to depress it, the rods check such tendency, and relieve the action on the cylinder. The vast strength and consequent stability of the pneumatic railway, when compared with a common railway, will be perceived. The latter is capable of sustaining a crushing pressure on the blocks, but only a deflecting pressure between them. The former is capable of sustaining a crushing pressure along the whole surface. The base or foundation of the former is one-third greater than the latter. The former is an unbroken, the latter a broken, foundation. There is, therefore, several times greater strength in the pneumatic railway than in the common railway; whilst in the pneumatic, there is a freedom from that violent action which the common has to sustain. There cannot be deflection, (which would, in the common railway, be advantageous, but for the raised points and the concussions,) nor the raised points, nor the shocks, nor the rocking motion, any tendency to which would be checked by the horizontal wheels which, acting against the pneumatic trough, have the effect of levers on the wheels, their peripheries

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being the fulcrums, and the axles the ends of the levers. There are no side blows from flanges to derange the foundation. The rails are supported over every line of the foundations, and the load remains distributed equally on all the wheels.

Regarding the economy of the pneumatic system, it will be understood, that the facility of surmounting slopes, such as the natural face of the country presents, by taking off the mere points of declivities, and making common formations, renders the large expenditure consequent on deep cutting, tunnelling, bridging, and the quantity of land rendered necessary by the extensive side slopes, which are proportional to the extent of such cutting and embankment, required by the common system, wholly unnecessary; and in lieu of such large expenditure in earth-work, the substitution of metal, the capital for which can never be considered as absolutely sunk; and it will be found, that the substitution of the latter will reduce the expenditure in the construction *fully one-third the average cost* of railways, and will, at the same time, admit of the application of steam power in its cheapest possible form; namely, high-pressure steam-engines, which will be found not to exceed *one-fourth the expense of locomotive steam power.* The quantity of metal required, and the price at which it can be obtained, with the common formation of the road, laying the cylinders, together with the well known cost of a steam-engine of any given power, the quantity and price of land, will with certainty afford the true estimate for the construction of a line of the pneumatic railway, and the well-known expense of maintaining the motive power of *fixed engines,* will as certainly give us the annual expense of working it.

The quantity of metal required for a double line of pneumatic railway will be, per mile, 1,600 tons; the price at which it is now offered is 6*l.* per ton, and may be had for 5*l.* for large contracts and cash-payments; the difference between iron in pigs and castings per ton, is usually 1*l.*; but taking the price at 6*l.*

The metal per mile will cost	£9,600
Land at per mile, say	1,000
Common formation and bridging . . .	2,000
Laying cylinders and joints	750
	13,350
Allow for contingencies per mile	1,000
Cost of pneumatic railway per mile . . .	14,350
Instead of for the common system . . .	23,000
Difference in favour of the pneumatic system per mile	£8,650

But where a single line of the pneumatic railway is constructed,

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the quantity of metal will only be 950 tons per mile, and the expense of the construction of the railway will be reduced nearly one-half on the pneumatic system; but as a more correct line may be taken between any two main stations, lessening the length of a line of railway will make a saving of from five to seven and a half per cent. on the invested capital.

The *greater speed* which may be attained on the pneumatic system with greater safety, will render a single line, in some cases, as efficient as a double line. For example, let the line

A ——— *c* ——————— *d* ——— B

be a line of railway 100 miles in length, divided into two stations, *c*, *d*, twenty-five miles a part (a system of regulated periods of starting the train is usual and indispensable on railways), as each station will be provided with a simple siding, or method of turning out a train, such as is intended to be used to communicate with branch lines, A and B, starting at appointed times, travelling thirty miles per hour, will arrive at about the same time at *d*. The train A, not having turned out at *c*, will turn out at *d*, the train B not having turned out at *d*, will proceed on to *c*, where it will meet another train arriving from A; B, not having turned out at *d*, will now turn out at *c*, allowing the second train A, to proceed to *d*, without turning out. Thus each train turning out once in fifty miles, and so on, for any given sections, the whole line being subdivided into sections of five miles by station valves, at which are placed the fixed engines. A single line of railway so worked is capable of effecting transit equal to a double line of the common system within the same time, and the cost of construction will not exceed one-third the cost of a common railway.

If the practical operation be shown on the single reciprocating line it will exemplify the whole system. Supposing the internal diameter of this line to be forty inches, this will admit a travelling diaphragm of the area of nine square feet nearly. It is proper here to point out the combination of the station valve, which is of the utmost importance in the pneumatic system, regulating and dividing as it does *the length of the column to be acted upon* into sections of from *three to five miles*, according to the levels, and enabling us *to work all the sections formed by the valves simultaneously*. At each station valve is a fixed high-pressure steam-engine, working an exhausting apparatus, which communicates with the railway. The included atmosphere contained in a section of five miles will be 240,000 cubic feet nearly.

If the velocity with which the trains travel be thirty miles an hour, this column of air must be removed in ten minutes of time, whatever may be the weight of the loaded train; but, although the column be removed *in ten minutes*, no greater degree of rarefaction takes place than hereafter stated. Suppose

the average load of the train to be sixty tons gross, and the road to be a level, the degree of rarefaction in the body of the railway to produce the tractive force, which according to the estimate on common railways is about $\frac{1}{250}$th of the load, is about half a pound pressure on the travelling diaphragm, equal to a fall of a column of one inch in the barometer gauge. But the absence of flanges on the travelling wheels, and the substitution of the horizontal wheels in lieu of them, will so much reduce friction, as probably to make the force of traction not more than $\frac{1}{350}$th, requiring a still slighter degree of rarefaction;—if to this be added a rarefaction equal to an additional inch of mercury, for contingency of leakage and friction for all velocities and loads, this will be *the reaction on a retarding force to the engine*, and it will be evident, that by maintaining this degree of rarefaction for ten minutes, the train will have arrived at the station with a speed of thirty miles an hour, and the whole column of air will have been removed. The power necessary to remove this column of 240,000 cubic feet in ten minutes is not great. It is proposed to establish in practice, at each station of five miles, as movers, two forty-horse high-pressure steam-engines. This will be the average power on a line, taking the average levels; and where the amount of transit may be equal to the Liverpool and Manchester Railway.

The use of high-pressure engines for this object affords the facility of varying the intensity of the power, simply by regulating the *quantity and pressure of the steam*, working them with a force equal to twenty, thirty, or forty horses, according to the amount of the load and the desired velocity.

Suppose the pressure of the steam on the piston to be 120 lbs. per square inch, the piston to be travelling 210 feet per minute, the engine performing thirty-five revolutions in a minute, working a three-throw crank applied to an exhausting apparatus of three cylinders, eight feet diameter, and six feet stroke DOUBLE ACTION, the quantity of air which the engine is capable of abstracting in one minute is 55,000 cubic feet, and in ten minutes about 550,000,—more than double the contents of a section of five miles of the railway.

It will be seen by reference to the specification, that only one column of air is to be removed by the action of the engine during the progress of the train. This is a particular and not unimportant feature of the pneumatic system of railway.

Dr. Lardner, in his remarks on that system, observes, "It is, in fact, a well-understood principle in physics, that whatever moving force be expended in producing the rarefaction of air in a cylinder or tunnel, must necessarily be followed by a corresponding force on the other side of the diaphragm, moving airtight in the tunnel, *and exposed to the free action of the atmospheric pressure.*" Now, it will be perceived that when the pneumatic railway is in action, the column of air being rarefied *before*

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the diaphragm, and before the train begins to move, the pneumatic cylinder being *always open behind that diaphragm,* for the admission and free action of the atmosphere through the aperture which is formed by letting the valvular cord over the governor as it advances, the atmospheric pressure *has that free action,* without which the rule would not apply; because if the atmosphere had to enter from the *end* of the cylinder in a length or section of five miles, or even of one mile, if the velocity were thirty miles an hour, or even twenty or ten, the friction of the *unrarefied column* would be great, and there would be a *reaction on the travelling diaphragm.* The stationary engine, or first mover, would have to *draw into the cylinder* a second column of air, whilst it was abstracting the first. As the second column could not be rarefied because of the diaphragm intervening, it would require an additional power twice as great as the first to move it; the action is widely different in the pneumatic railway, the travelling diaphragm ever advancing on a *lighter medium,* whilst the length of the column is rapidly shortening as the train approaches the station.

It is found by experiment, and verified in practice on a large and extended scale by Mr. Hague, that the transmission of an impulsive or impelling force through a pipe of several miles in length, under the influence of a partial vacuum or rarefaction, is so instantaneous, that it is difficult, if not impossible, accurately to measure its velocity. Mr. Hague transmits a power to a distance of seven miles, in one instance, under a high degree of rarefaction—from seven to ten inches of mercury,—the barometric gauge stands at the same height at both ends of the transit tube, and stop-watches held at the extremities cannot detect the time of the transmission of the impulse. Mr. Hague has constructed many such apparatus, which are now in successful operation in many parts of the world.

Under the action of a plenum, the facts are widely different. When air is forced into a pipe with any great velocity, it is compressed: air, under compression, parts with its latent heat and loses its elasticity, when the power to impel it must be increased in proportion to the square of the velocity, and the square of the density.

Having shown the degree of rarefaction necessary for a level line, I need hardly state, that in order to surmount any acclivity, we have only to induce such *additional degree of rarefaction* as shall be sufficient to counteract *gravity,* and we ascend the plane. High-pressure engines readily afford that facility; we have only to let on more steam to the piston cylinder, and the means are certain: there is but the same column of air in the pneumatic railway, whether it be on a level or on an inclined plane. If the engine performing thirty-five revolutions per minute, to propel a given load in a given time, and when the

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train arriving at a slope, say of 1 in 120, the *number of revolutions* be reduced to 12 per minute, we have only to let on as much more steam as will effect the same number of revolutions, when abstracting the column of air *within the same time as on a level*, and we shall surmount the slope with the same speed.

When the train descends the opposite plane, proper friction drags being put on, the train will descend by gravity; the engine continuing to work will accumulate power to assist in ascending an opposite plane, should there be one. The absence of flange wheels, the use of which destroys so large a portion of the momentum gained by ordinary engines, and the substitution of horizontal or anti-friction wheels, which act near the axles of the wheels, afford the application of wheels of six feet diameter. Wheels of such height, and the absence of flanges, leave a free traction for the accumulation of momentum, and this circumstance will diminish very considerably the amount of traction necessary for a given load. The weight of a locomotive steam-engine with its tender, is usually from ten to twelve tons. The weight of the pneumatic governor and dynamic traveller and its diaphragm, which will impel an equal gross load, will weigh but one and a half tons.

The violent action of the locomotive engine, and the shocks produced by the ordinary railway, make heavier waggons and carriages necessary. The absence of these causes on the pneumatic railway, render lighter vehicles available. The locomotive engine and heavy waggons and carriages bear a large proportion to the gross load on an ordinary railway. I may here add that the travelling diaphragm does not work friction tight; it is an expanding one, having guide wheels, which accommodate it to any slight irregularity. This obviates the necessity of a perfectly true cylinder, and no boring is required, as has been by some supposed. The diaphragm is furnished with a valve, which is under the control of the conductor of the governor, which being opened, the current of air passes through, the power on the train ceases, and friction bands *check the progress of*, and stop the train;—when the valve of the diaphragm is again closed, the power is again in action, and the train proceeds. The barometric gauge at the engine station will indicate the retardation arising from the weight of the load, and will show, by its action, when the train starts, and the time will indicate the distance and situation of the train.

In order to estimate the expense of motive power on the pneumatic system of railway, the Liverpool and Manchester Railway will afford a basis which will be a criterion for any other line of railway, taking into consideration when the estimate is applied to any other line, whether the double line or the single reciprocating line of the pneumatic railway be adopted; and considering also whether the average amount of transit on any such line requires the fixed engines to be constantly kept in

operation at the full power provided for any exigency which may occur; or whether the average amount of tonnage requires them to be worked at only half or two-thirds their maximum power, and considering likewise the particular locality of any line or portion of any line of railway, because the expense of maintenance of either stationary or locomotive steam-engines will greatly vary, between Middlesex and Lancashire.

By a reference to the Half-yearly Report of the Directors of the Liverpool and Manchester Railway, ending 30th June, 1834, the item "Maintenance of way" is 9,350*l.* 17*s.* 5*d.*, the rate of 623*l.* per mile per annum; but that being an unusually heavy half year, the estimate may be taken at 550*l.* per mile per annum.

Total per annum - - - -	16,500	0	0
The item locomotive power was for the half year 15,640*l.* 17*s.* 10*d.* per annum - - - -	31,281	15	8
	£47,781	15	8

If on the Liverpool and Manchester Railway the pneumatic system was applied, and the line divided into sections of five miles, the maximum power of fixed engines capable of transporting the utmost amount of tonnage ever passing over that railway in one day with the usual speed, would be two forty-horse engines at each station on the average, so disposed according to the levels and slopes, as that on the summit of Rainhill and Sutton inclined planes, there should be two engines of fifty-horse power; this is a larger power than is necessary for the actual work to be done—the general power which probably they would be required to perform would be thirty horses; the cost of these engines may be taken at 30*l.* per horse power, or per

station - - - - -	£2,400	0	0
Engine-house and chimney -	600	0	0
Dwelling and water-well - -	200	0	0
Pneumatic machinery and station valves	500	0	0
	£3,700	0	0
Six stations at £3700=22,900			
Interest on invested capital -	1,110	0	0
General depreciation 1½ per cent. -	333	0	0
Maintenance of engines per station £500, each £1,000 - -	6,000	0	0
Maintenance of way £150 per mile	4,500	0	0
Twenty governors at £150, £3,000			
Interest on capital and depreciation 6½	195	0	0
Repairs £30 each - -	600	0	0
Contingencies £10 per cent -	1,273	10	0

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Annual expenses of pneumatic railway - - -	£14,011	10	0
Annual expenses of common railway - - -	47,781	15	8
Difference in favour of the pneumatic railway on a line of thirty miles - -	£33,770	5	8

I have founded the estimates for stationary power on the report of Messrs. Walker and Raistrick, to the directors of the Liverpool and Manchester Railway.—(See note 1 of that Report.)

On the Liverpool and Manchester Railway the trains pass nine times a day from each end of the line, or once in an hour and twenty minutes. The pneumatic railway admits of a train being passed over a section of five miles with a speed of thirty miles an hour in ten minutes, or with a speed of twenty miles in fifteen minutes. If, therefore, there be allowed an interval of fifteen minutes for preparing and adjusting the carriages, a train may be passed every half hour.

I will only add, that active preparations are now being made for the construction of a practical line, on a full scale, which will be in operation within a very few months, and in which line all the mechanical details will be developed.

I have the honour to be, Sir,

Your obedient humble servant,

HENRY PINKUS.

New Patents
SEALED IN ENGLAND,
1835.

To James Stevenson, of Leith, merchant, and John Ruthven, of Edinburgh, mechanician, for their invention of a method of cutting wood, by certain improved instruments.—Sealed 28th April—6 months for inrolment.

To Charles William Rowley Rickard, of Thistle-grove, Kensington, in the county of Middlesex, engineer, for his invention of certain improvements on boilers applicable to steam-engines and other purposes. —Sealed 28th April—6 months for inrolment.

To William Simpson Potter, of Verulam-buildings, in the county of Middlesex, merchant, for certain im-

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provements in rendering fabrics waterproof, being a communication from a foreigner residing abroad.—Sealed 28th April—6 months for inrolment.

To John Somerville Clerk, minister, of Currie, in the county of Edinburgh, for his invention of certain improvements in the construction of guns or muskets, and other such fire-arms.—Sealed 28th April—6 months for inrolment.

To Isaac Dodds, of Horsley Iron-works, in the parish of Tipton, in the county of Stafford, engineer, for his invention of certain improvements in the construction of fire-arms, part or parts of which improvements may be applied in the making and using of common and other ordnance.—Sealed 30th April—6 months for inrolment.

To John Reynolds, of Oakwood, near Neeth, in the county of Glamorgan, iron-master, for his invention of certain improvements in railways.—Sealed 5th May—6 months for inrolment.

To William Simpson, of Evesham, in the county of Worcester, jobbing smith, for his invention of a safety drag or lever slide for carriages.—Sealed 9th May—6 months for inrolment.

To Joseph Egg, of Piccadilly, in the county of Middlesex, gun-maker, for his invention of improvements in certain descriptions of fire-arms.—Sealed 9th May—6 months for inrolment.

To Alphonse Humbert Jean Francois Valois, of the city of Lyons, in the kingdom of France, but now residing at No. 9, Artillery-place, Finsbury-square, in the county of Middlesex, gentleman, for his invention of a certain improvement or certain improvements in the mode or method of producing engravings, etchings, or reliefs on metallic plates (for producing impressions therefrom), and in the apparatus used in the same.—Sealed 13th May—6 months for inrolment.

To Thomas Dunkin, of Bordeaux, in the kingdom of France, but now residing at No. 2, Trinity-place, Charing-cross, in the parish of St. Martin-in-the-Fields, and county of Middlesex, late officer in the 18th regiment of Hussars, for certain improvements in the mode, method, or system of obtaining or producing duplicate copies of manuscripts, writings, and drawings, and in the apparatus or machinery used in the same.—Sealed 13th May—6 months for inrolment.

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To Charles Chubb, of St. Paul's Churchyard, in the city of London, patent lock manufacturer, for his invention of certain improvements in the means of making secure receptacles for property, such receptacles being either fixed or transportable, and being such as are usually called strong doors, safes, chests, and boxes.—Sealed 13th May—6 months for inrolment.

To Henry Dunnington, of Nottingham, and William Copestake, of Stapleford, both in the county of Notts, lace-manufacturers, for their invention of certain improvements in making or manufacturing lace.—Sealed 13th May—6 months for inrolment.

To John Buchanan, of Ramsbottom, in the county of Lancaster, millwright, for his invention of certain improvements in the construction of cylinder printing machines used for printing paper, calico, and other fabrics.—Sealed 13th May—6 months for inrolment.

To Pierre Frederick Fischer, of Great Marlborough-street, in the county of Middlesex, merchant, for certain improvements on piano-fortes; being a communication from a foreigner residing abroad.—Sealed 18th May—6 months for inrolment.

To John Ody, of the Strand, in the county of Middlesex, patent truss-manufacturer, for his invention of an improved construction of water-closets.—Sealed 13th May—4 months for inrolment.

To Charles Schafhault, of 77, Cannon-street, in the city of London, gentleman, for his invention of an improvement in the mode of manufacturing malleable iron.—Sealed 13th May—6 months for inrolment.

To Alexis Dumoulin, of Leicester-square, in the county of Middlesex, merchant, for his invention of certain improvements in gas-apparatus.—Sealed 19th May—6 months for inrolment.

To William Patterson, of Dublin, gentleman, for his invention of a new material for tanning hides and skins, which is also applicable to other purposes.—Sealed 20th May—6 months for inrolment.

To John George Bodmer, of Bolton-le-Moors, in the county palatine of Lancaster, civil-engineer, for certain improvements in machinery for preparing, roving, and spinning cotton and wool.—Sealed 27th May—6 months for inrolment.

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CELESTIAL PHENOMENA, for June, 1835.

D. H. M.

1 — Clock after the ☉ 2m. 38s.
— ☽ rises 7 h. 41 m. M.
— ☽ passes the mer. 4 h. 9m. A.
— ☽ sets morn.
15 53 ♂ in conj. with the ☽ diff. of dec. 3. 32. S.
3 10 23 Pallas in oppo. ☉
4 8 6 ☽ in □ or first quarter.
Occul. ν Virginis, im. 12h. 6m.
5 Clock after the ☉ 2 m. 0 s.
— ☽ rises 0 h. 53 m. A.
— ☽ passes the mer. 7h. 26m. A.
— ☽ sets 1 h. 27 m. M.
6 4 31 ♄ in conj. with the ☽ diff. of dec. 1. 41. S.
Occul. 65 Virginis, im. 8h. 48m.
Occul. 66 Virginis, im. 9h. 37m.
Occul. 1² Virginis, im. 13h. 39m., em. 14h. 5m.
9 6 0 ☽ in Perigee.
10 10 46 Ecliptic oppo. or ○ full moon.
— ☽ eclipsed vis. see note.
11 56 Ceres in oppo ☉
— Clock after the ☉ 1m. 5s.
— ☽ rises 8 h. 10 m. A.
— ☽ passes the mer. morn.
— ☽ sets 3 h. 8 m. M.
— Occul. θ Ophiuchi, im. 9h. 16m., em. 10h. 22m.
14 Occul. 243 Capri, im. 16h. 2m
15 Clock after the ☉ 0m. 4s.
— ☽ rises morn.
— ☽ passes the mer. 4h. 4m. M.
— ☽ sets 8h. 27m. M.
7 15 ♃ in conj. with the ☉
8 50 ♅ in conj. with the ☽ diff. of dec. 4. 45. N.
17 Mer. R. A. 7 h. 28 m. dec. 23. 1. N.
— Ven. R. A. 3 h. 39 m. dec. 17. 57. N.
— Mars R. A. 9 h. 46 m. dec. 14. 45. N.
— Vesta R. A. 6 h. 42 m. dec. 23. 18. N.
— Juno R. A. 2 h. 49 m. dec. 10. 38. N.
— Pallas R. A. 16 h. 57 m. dec. 25. 35. N.

D. H. M.

17 Ceres R. A. 17 h. 7 m. dec. 22. 52. S.
— Jup. R. A. 5 h. 35 m. dec. 23. 3. N.
— Sat. R. A. 13 h. 4 m. dec. 4. 3. S.
— Georg. R. A. 22 h. 11 m. dec. 12. 1. S.
— ☿ passes the mer. 1 h. 49 m.
— ♀ passes the mer. 21 h. 59 m.
— ♂ passes the mer. 4 h. 6 m.
— ♃ passes the mer. 23 h. 52 m.
— Occul. σ Piscium, im. 12 h. 28 m., em. 13 h. 22 m.
18 0 6 ☽ in □ or last quarter.
19 12 ☿ greatest elong. 25. 2. E.
20 Clock before the ☉ 1 m. 0 s.
— ☽ rises 1 h. 12 m. M.
— ☽ passes the mer. 7h. 43m. M.
— ☽ sets 2 h. 29 m. A.
11 21 ♄ stationary.
21 15 ☽ in Apogee.
16 55 ☉ enters Cancer, Summer commences.
22 ♄ greatest Hel. lat. N.
23 1 33 ☿ descending node.
5 43 ♀ in conj. with the ☽ diff. of dec. 0. 58. S.
25 Clock before the ☉ 2 m. 5 s.
— ☽ rises 2 h. 55 m. M.
— ☽ passes the mer. 11h. 27m. M.
— ☽ sets 8h. 9m. A.
26 4 21 Ecliptic conj. or ● new moon.
27 14 19 ☿ in conj. with the ☽ diff. of dec. 5. 7. S.
30 2 20 ♂ in conj. with the ☽ diff. of dec. 4. 21. S.

A partial eclipse of the *Moon*, June 10.

First contact with Penumbra, 8h. 32,1m.
First contact with dark shadow, 10h. 7m.
Middle of eclipse, 10h. 35,6m.
Last contact of dark shadow, 11h. 4,2m.
Last contact of Penumbra, 12h. 39,1m.
Greenwich mean time.

Magnitude of the eclipse (Moon's diameter=1) 0.07 on the northern limb.

J. LEWTHWAITE, Rotherhithe.

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METEOROLOGICAL JOURNAL,

FOR MARCH AND APRIL, 1835.

1835.	Thermo.		Barometer.		Rain in inches.	1835.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low.	High.	Low.			Hig.	Low.	High.	Low.	
March						April					
26	47	25	30,43	30,30		10	64	43	30,05	29,93	
27	49	27	30,27	30,24		11	58	32	30,04	29,95	
28	49	31	30,19	30,18		12	59	25	30,10	30,07	
29	46	30	29,99	29,90		13	64	32	30,15	30,12	
30	50	28	29,86	29,79		14	62	34	30,17	Staty.	
31	55	31	29,78	29,74		15	59	38	30,13	30,00	
April						16	44	30	30,12	30,04	
1	62	36	29,79	29,70	,075	17	43	27	30,18	30,16	
2	66	41	29,91	29,80	,025	18	46	26	30,08	30,01	
3	62	47	29,90	29,80		19	50	36	30,16	30,06	
4	51	40	30,04	29,95	,65	20	53	33	30,25	30,21	
5	54	41	30,17	30,16	,05	21	51	42	30,26	30,35	
6	58	35	30,29	30,24	,05	22	61	39	30,34	30,32	,025
7	63	40	30,35	30,34		23	58	42	30,36	30,32	
8	64	45	30,30	30,23		24	62	43	30,29	30,24	
9	66	37	30,14	30,10		25	53	42	30,10	29,82	

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37 32 N.
Longitude 3 51 West of Greenwich.

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PS.*—I find by the reports in circulation, that it is believed by many that the method of propulsion effected in the Pneumatic Railway is by a plenum, in other words, by *forcing air into the tunnel* behind the travelling diaphragm. This is quite erroneous,—such a method would not be practicable. It is by rarefying the air, or abstracting it *before* or on the advanced side of the diaphragm, and thereby producing a balance or pressure of air on the opposite side, or behind it. The impelling power, is admitted through the aperture behind the diaphragm, on which it impinges, and propels it forward, but this is only *by its natural weight,* with its usual bulk ;—the air is not compressed.

The impracticability of forcing air through a long pipe or tunnel, so as to obtain power and velocity, may be easily understood; the difficulty arises, principally, from its compressibility and friction, and consequent inelasticity or inertia; which increases in a fourfold proportion with the pressure, and for any required power would increase in like manner in proportion as the area of the pipe diminished;—this would produce a re-action on the first mover.

In the case of passing gas through mains or pipes there is no difficulty, because, common gas is like rarefied air, being usually about *half its specific gravity* ;—.500—hence a slight pressure suffices to impel it, there being no air in the pipes to retard, and its friction is proportional to its gravity. To make gas of equal specific gravity, would require a pressure equal to nearly fifteen inches of mercury, and it would have an *elasticity* or *re-action* equal to the additional pressure, but when compressed it would require four times the force to impel it with the *same speed,* and this force would have to be quadrupled in any time in which the velocity were doubled,

* This postscript appeared in only a part of our June number.

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every time the pressure is doubled the elasticity of the gas will be doubled; until, as with air, or steam, it began to lose *elasticity* by radiation of heat—while gas and air would become inert, steam would condense. It was upon the reflection of these facts that I was induced to abandon a project that I entertained in the year 1825, for producing a motive power, to propel by means of a steam tube or cylinder having a transmitting piston to be propelled by the pressure of steam, —that is—by passing a current of steam through the whole length of a pipe laid along a line of road or canal, with arrangements in some degree similar to those applied in the Pneumatic Railway, except the pipe being a duplex pipe, having a jacket through which I proposed to circulate hot water or steam to prevent condensation. The steam to be let in from boilers or generators, placed at stations along the line of way;—but the loss by radiation of heat, the great quantity of steam, and above all the great friction which must be proportional to its expansive force, and the consequent *retardation*—the low speed,* made its inefficiency, not to say impracticability conclusive.

H. P.

* The usual speed of the Piston of a Steam-Engine is 220 feet per minute.

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No. XXXIX.

Recent Patents.

To Samuel Draper, *of Basford (formerly of Old Radford), in the county of Nottingham, lace-maker, for an improved machine for making an improved manufacture of figured bobbin-net, or what is commonly called bobbin-net lace.*—[Sealed 25th September, 1834.]

This invention has three features of novelty, by the application of which an improved machine, for making an improved manufacture of figured bobbin-net, or what is commonly called bobbin-net lace, may be obtained, as will be hereafter fully described.

It may be desirable here to premise, that in making figured bobbin-net lace by machinery, constructed according to any of the known arrangements, three descriptions of threads (that is to say), threads having

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three distinct names, are used. First, the warp threads running longitudinally, and from end to end of the piece of net, and which consist of a number of threads wound on what is called the warp beam or roller. Secondly, bobbin threads, which are the threads wound on separate bobbins, and actuated with the carriages, in which such bobbins are placed. Thirdly, extra guide threads, which are usually separate threads passing through guides, such threads, in most instances, coming from separate spools or bobbins, which turn on axles at suitable parts of the machine. These guide threads being employed when figured lace is to be produced, or when breadths of plain net are to be made, all which are well understood, and are only mentioned by the Patentee the better to enable him to point out one distinct feature of his invention, which consists in dispensing with the warp beam, and consequently with the ordinary warp threads, and their guide bar or bars, and substituting in its place an additional set of carriages with their bobbins, the threads of which additional set of carriages are to make up for the ordinary warp threads, as hereinafter described.

The second feature of this invention consists in the application of certain lever drivers, one to each space (in which the carriages travel), between the bolts; thus making each driver separate from, and independent of, every other driver, whereby any carriage or carriages may be actuated, wholly independent of the other carriages; by which means figured bobbin-net, of an improved manufacture, and varying in design, may be produced with much greater facility than heretofore; and, at the same time, the pattern may, from time to time, be changed even in the same piece with much less difficulty than in the present lace machines.

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The third feature of this invention consists in using the upper and lower sets of carriages (for making the lace) with guides or elongations, as hereinafter described, with the view of keeping the threads of their respective bobbins clear from one another, and thereby giving greater facility in taking up the twist, and also, in a great measure, prevent what is called cotting of the threads. Having thus pointed out the objects of this invention, the Patentee proceeds to describe the drawings.

Fig. 1, Plate X., represents parts of a front view of a machine, constructed according to this invention. Fig. 2, is a transverse section, by which the relative positions of the various parts will be evident to a competent workman acquainted with this description of machinery. In each of these figures, as well, also, as in the several detached views, the same letters of reference are used to denote the same parts wherever they occur: *a*, *a*, being the front circular bolts; *b*, *c*, the back circular bolts, which, it will be seen, are divided into two parts; the part *b*, being affixed to the back circular bolt bar, and the part *c*, is affixed to the bar *d*; consequently the bar *d*, with its parts of bolts *c*, will be able to shog independently of the parts of the bolts *d*, and the back bolt bar, with its parts of bolts *b*, independently of the parts *c*; the object of which will be hereafter fully described; the front bolt bar and its bolts *a*, being at all times stationary; *e*, *e*, are the upper circular combs and their comb bars, which bars are stationary; *f*, is the treadle shaft, which is actuated by the ordinary treadles, as is clearly shown in the drawing at fig. 2. On to the treadle shaft *f*, are affixed the projecting arms *g*, one at each end of the machine; and to these arms the connecting bars or rods *h*, are affixed by screws, there being slots cut to allow of adjustment.

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To these bars or rods *h*, are connected the rods *i*, which work the frame *j*, which swings on the axles or studs *k*. This swinging frame *j*, works the front and back catch bars *l*, *l*, as will be fully described hereafter. The bars or rods *i*, being connected to the bars or rods *h*, and to the frame *j*, by pins or axes *m*, as shown in fig. 2.

The swinging frames *j*, are one at each end of the machine, and have mortices *n*, cut therein, in order to allow of the axis *o*, on which the catch bars work, being adjusted. There are two catch bars, one at the front and the other at the back of the upper set of carriages, working in the combs *e*. By this means, the working of the treadles will cause the frames *j*, to oscillate on the axes *k*, at each end of the machine, which will cause the front and back catch bars to work the upper set of carriages.

The catch bars *l*, *l*, are mounted on arms *q*, *q*, which arms turn on the axes *o*, *o*, at each end of the machine, and the axes *o*, *o*, being affixed to the swinging frames *j*, (but capable of adjustment); they are, consequently, moved to and fro with the frame *j*; and the arms *q*, of the catch bars, would also only partake of the same motion, but for the rests or supports *r*, *r*, which are affixed to the front and back upper comb bar. These rests or supports *r*, *r*, being placed with a view to lift the catch bars from the carriages, and also prevent the catch bars falling upon the carriages too suddenly, the supports *r*, permitting the catch bars to be progressively lowered at suitable times, there being stops (not shown in the drawing) placed at the back of the arms *q*, in order to prevent the catch bars being thrown too far back.

In fig. 2, is shown the back catch bars retaining the carriages in the back upper combs *e*. The putting down of the left foot treadle will cause the frame *j*, to

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swing from back to front, which will carry with it the back catch bar, and thus push the upper set of carriages in the threads of the lower set of carriages.

In the continued motion of the frame *j*, the back catch bar will rest on the supports *r*, which will throw back the blade of it out of the carriages; at the same time, the front catch bar will be permitted, by its supports *r*, to descend into the carriages, and will draw them into the front combs; the putting down of the right foot treadle will produce a like effect on the front catch bar, that is to say, the front catch bar will drive the carriages into the threads, and then be lifted out of the carriages, whilst the back catch bar will descend, and draw the carriages again into the back combs. The arms *s*, *s*, which swing on axes *t*, at each end of the machine, and are intended to work the driving bar *u*, which drives out the carriage from the lower bolt *b*, and also from the bolts *c*. The driving bar *u*, being connected with the swinging arms *s*, *s*, merely by the pins *v*, by which means the driving bar *u*, moves with the arms *s*.

To ensure the carriages being retained in their proper situations at the times of shogging, either the bolt bar *b*, or the bolt bar *c*, there are two bars, which the Patentee calls dividing bars, *w*, and *x*, from end to end of the bolts, which, coming between the ends of the bolts *a*, *b*, and *c*, thereby separate the carriages in any one of those bolts from the carriages which are in either of the other bolts. These bars *w*, and *x*, turn on axes *y*, *z*, and are worked by the swinging of the arms *s*, by what are termed fingers or bent arms, attached to the arms *s*, which pass under such bars *w*, and *x*, and raise them alternately by the moving of the arms *s*, such bars *w*, *x*, falling out of the way at the proper times.

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The large drum or cylinder which works the lever drivers B, has a series of strips of brass, or other suitable metal C, which the Patentee calls catches, which coming in contact with the ends of the lever drivers B, cause them to drive the carriages out of the bolts *a*, into the bolts *b*, and *c*. In order to release these lever drivers so soon as they have made part of their movements, and have actuated their several carriages, the drawing bar D, which is connected to, and worked by, the swinging arms *s*, is moved in like manner to the driving bar *u*; but that this bar D, works up and down on two inclined planes, affixed one at each end of the machine. The drawing bar D, takes hold of the carriages, and assists in driving them, that is to say, so many of the lever drivers B, as are acted on by the catches A, and C, on the cylinder, having driven forward their respective carriages, the same will be carried forward by the drawing bar D; but with respect to the carriages of such lever drivers as are not acted on by the catches A, and C, of the cylinder, they will remain in the bolts *a*; for the drawing bar D, does not rise up under the bolts *a*, so as to touch any carriages, till they are first driven forward part of the way by the lever drivers B.

In addition to the catches C, on the cylinder, there are catches A, according to the placing of which, as is hereinafter fully described, so will be the pattern of the figured bobbin-net produced. The lever drivers are shown separately at fig. 3; their shape and construction will, therefore, be understood: they respectively move on a wire or axis, which is supported by the plates E, cast in leads, which are affixed to the bar F. One of these lever drivers is to be placed within each space between the bolts *a*, by which they will be retained in their places; and thus will each driver be

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free to be actuated, independently of all other of the lever drivers, as before mentioned.

The Patentee here remarks, that in order to prevent complexity of the drawing, he has omitted several parts, which being well understood, and in general use, have only to be named, to enable the machinist, acquainted with this description of machinery, to put them in their proper places. Thus the springs and casters back for the point bars are to be applied as usual, excepting the point bars of this machine do not require to be moved more than half an inch in taking up.

The Patentee has also omitted the requisite stops of the bolt bars *b*, and *c*, for adjusting the quantity of motion lengthwise, which is one gait when the machine is worked, as hereinafter described; that is, a distance of one space to the next in the bolts *b*, and *c*. The means of turning the work roller to take up the work, also the spurs for distending the work, are to be placed as usual.

The Patentee has omitted the fingers and levers for working the bolt bars, point bars, and pin bars, by their respective wheels; also for working the cylinder: he has also omitted the drivers and clawkers, which are well understood.

The detached figs., Nos. 1, to 10, show the wheels for working certain parts of the machine, such being on the upright shaft at the right hand end of the machine, as is shown in fig. 1; in which figure the number of the respective wheels correspond with the numbers marked on the wheels in the detached figures. The wheel No. 1, is a ratchet wheel, which is actuated by the ordinary drivers and clawkers, moved by the working of the treadle or spindle bar one tooth each time either of the treadles descend. No. 2, is the wheel for propelling

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the cylinder, which has six teeth or notches coming in contact with a lever to which is attached a driver, working the cylinder one tooth of its ratchet wheel at the descent of either of the treadles; and the ratchet wheel on the axes of the cylinder has one hundred and eighty teeth. No. 3, wheel for shogging the bolt bar *c*. No, 4, the wheel for shogging the back bolt bar *b*. No. 5, wheel for moving in the driving bar *u*, it actuating a lever which moves a half jack striking from the outside of the wheel. No. 6, wheel for moving driving bar out of the back bolts *b*, by similar means to those last described, but striking from the inner side of the wheel; there being a tooth or notch to drive out and in, whenever the catches A, and C, act on the lever drivers. No. 7, wheel to throw out lower point or stump bar every time there has been a cross or interlaying put on to allow of the crossings going up. No. 8, wheel for shogging lower point or stump bar, which causes this bar to shog to and fro one gait single tier twice in each mesh; that is to say, shogs to the left hand and back in the first half mesh, and to the right hand and back for the second half mesh to put on the twist. Nos. 9, and 10, are the wheels for throwing out the back and front point bars. The wheels at the other end of the machine are of a similar character, as is known to a workman; but the wheel for actuating the cylinder is omitted. It is well understood that these wheels work their respective parts of the machine by the intervention of what are called levers and fingers; they being jointed by slots, and have set and adjusting screws to adjust them correctly for their work.

Having thus described the nature of his invention, and the manner of combining various movements requisite for carrying the invention into effect, the Patentee

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proceeds to describe the manner of working the machine, commencing from the position of the various parts as shown in fig. 2; that is to say, the right foot treadle is down, one half of the lower set of carriages are in the spaces between the bolts *a*, and the other half are in the spaces between the parts of the back bolts *c*, the whole of the carriages of the upper set being in the spaces of the back combs *e*. The Patentee here remarks, that in the first place it is his intention to describe the various movements which take place in working to produce the plain part or the ground of bobbin-net lace. Having this description clearly in mind, it will become more readily evident by what means any figure within the capacity of the machine may be produced; for in all cases there will be some of the carriages actuated for making the plain net, whilst others are being actuated for producing the figured part of the bobbin-net lace. By putting down the left foot treadle, the back catch bar drives the upper set of carriages into the threads of the lower carriages, as is shown in fig. 4.

The cylinder is moved one tooth of its ratchet wheel, and actuated the whole of the lever drivers B, whereby the lower set of carriages are driven into the back bolts *b*, and *c*. The back bolt bar and the bolt bar *c*, are then (by their wheels) shogged one gait to the right hand of the workman. The carriages from the back bolts *b*, *c*, are driven into the bolts *c*, and *a*; that is to say, those carriages which were in the bolts *b*, are driven into the bolts *c*; and those carriages previously in the bolts *c*, are driven into the bolts *a*. By this time the front catch bar draws the upper tier of carriages into the front upper combs *e*, as is clearly shown in the drawing, fig. 5. The back bolt bar and the bolt bar *c*,

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are shogged by their wheels one gait to the left hand; consequently the carriages, which at the commencement were in the bolts *a*, have passed on gait to the right hand. The right foot treadle is to be put down, and in so doing the upper tier of carriages are driven into the threads by the front catch bar. The cylinder is driven one tooth, but does not actuate the lever drivers, there being no catch A, in the way of such lever drivers: continuing the descent of the right foot, the back catch bar draws the upper tier of carriages into the back combs; the middle bolt bar *c*, is shogged one gait to the right and back to the left.

The left foot treadle is again to be put down: the back catch bar drives the upper tier of carriages into the threads. The cylinder is turned one tooth; but there being no catch A, in the way, the lever drivers are not acted on. The bolt bar *c*, shogs to and fro, as before. The continued descent of the left foot causes the front catch bar to draw the upper set of carriages into the front combs: the back bolt bar shogs one gait to the right hand of the workman. This completes the first half mesh. The right foot is again to be put down. The front catch bar drives the upper set of carriages into the threads. The cylinder is turned one tooth, and drives the bottom set of carriages by the lever driver into the back bolts *b*, and *c*. The back bolt bar *b*, shogs one gait to the left. The driving bar in the back bolts *b*, drives the lower set of carriages into the bolts *c*, *a*; consequently, the carriages which were in the bolts *c*, at starting, this movement of the foot have passed one gait to the left. The back catch bar brings the upper set of carriages into the back combs. The left foot is to be again put down. The back catch bar drives the upper set of carriages into the threads. The

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cylinder moves one tooth, but without acting on the lower set of carriages: the front catch bar draws the upper tier of carriages into the threads. The cylinder moves one tooth, but does not actuate the lower set of carriages.

The back catch bar drives the upper set of carriages into the back combs. The bolt bar *c*, shogs one gait, and back again: this completes a mesh.

The Patentee states, that he has purposely omitted any mention of the upper front and back point bars for taking up the twist, in order to prevent complexity; but he states that these point bars take up at the finish of each half mesh. The back points take up when the upper set of carriages are in the front combs; and the front points take up the half mesh when the carriages are in the back combs. These motions, when continued, would produce only plain net, or what is commonly called bobbin-net lace. It will now become readily evident, from the future description, how the machine is worked for producing figured bobbin-net.

It is well known that in pillow lace a great variety of patterns are produced by what are termed eyelet holes and finings; that is to say, eyelet holes are where two or more meshes are made into one hole by the diagonal threads not crossing, which would otherwise divide such hole into two or more meshes: finings is that appearance which is produced by the diagonal threads crossing each other, and being held together as a tissue or fabric by the vertical threads. Somewhat similar effects have to a certain degree been obtained in bobbin-net machines; but by my improved machine for producing figured bobbin-net, the same may be produced, varying in pattern, and of an improved manufacture, not only by a varied use of these two descriptions of ornament-

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ing separately, but also combined together with a variety of other appearances depending on the working of the machine. And although it would be impossible to enter into a full description of every pattern the machine is capable of producing, yet it will be desirable to give such directions as to the working of the machine, as will enable a workman to understand in what manner the machine operates; and in doing so the Patentee makes choice of a simple pattern, which shall run in constant succession from end to end of the piece of lace; and as every pattern will more or less be produced by similar actions, but depending on taste as to their figure, and particular placing the description of such simple pattern will suffice.

Having described such simple pattern, a competent workman will readily make such changes of the parts as will enable him to produce the patterns desired, and to the figures desired. Suppose it is wished to make square patches of what is called finings, at certain intervals, in regular succession from end to end of the piece; and that such square patches shall be at equal distances across the machine, let it be supposed that the patch shall be at every 9th, 10th, and 11th mesh across the machine, and that such patches shall be at every 10th, 11th, and 12th meshes throughout the length of the piece of lace; therefore such finings will be a square of three meshes each way. The cylinder is described as having a series of steps of metal or raised surfaces C, from end to end, which the Patentee calls catches: these are for the purpose of producing plain net. In order to accommodate the machine for making the pattern above mentioned, a strip of metal, or other material A, of the exact width of three lever drivers, is to be affixed on

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the cylinder in those places where the carriages were missing in making plain net as above described, and such as are shown at A, A, figs. 1, and 2; that is, in such a manner as to come against the 9th, 10th, and 11th lever drivers across the machine, whereby every motion of the treadles will actuate those carriages. Thus, supposing the machine to be started from the position shown in fig. 2, and that the first motion be gone through, and that there is at every 9th, 10th, and 11th lever driver a catch A, the second move will at all those positions produce the fining at the third motion, the lever drivers will come in contact with the next catch A: the fourth movement will come to the same catches as make the ground or plain net, but which will continue making the finings in the places desired. The fifth motion brings the next catch A, into action: and the sixth motion the next catch A: and this motion completes the mesh.

The cylinder being prepared with similar catches A, for the next two meshes, a similar result will take place. Plain net is then to be made by omitting the catches A, till the next tenth row of meshes comes to be made; then again the catches A, are to be in their places, that is, two catches A, between each of the catches C, which work the plain net for making the three next meshes, and the cylinder being thus set out with catches A, the length of lace will be produced of the pattern above mentioned.

It may be desirable to remark, that, according to the number of lever drivers acted upon by the catches A, and their situations on the cylinder, so will be determined the pattern to be produced, all which must depend on taste.

It should, however, be stated, that it is not necessary that the patterns should run in straight lines in the

length of or across the piece; on the contrary, they may be run in almost any direction, say, for instance, curves or vandykes: thus, supposing that the first line of meshes, having the fining, commenced at every 9th, 10th, and 11th mesh across the piece to be performed; that then in working the second row of meshes the catches A, were so placed as to come against and actuate the 11th, 12th, and 13th lever drivers across the width of the piece, and that, in working the third row of meshes, the 12th, 13th, and 14th lever drivers were acted on, this would produce a pattern of patches of fining, sloping diagonally across the width of the piece of lace.

If it is desired to work in gymp threads in varied directions, say, for instance, around the diagonal patches of finings above described, ordinary guides (carrying such gymp threads) on a guide bar, are to be placed in the improved machine; such bar having the requisite shogs, as is well understood, placed just below the straight edges. In such case there are to be no catches A, C, opposite the three lever-drivers, 9, 10, and 11, of the first row of meshes; no catches A, C, opposite the 8th, 9th, 10th, 11th, and 12th lever drivers in the second row of meshes; and no catches A, C, opposite the 7th, 8th, 9th, 10th, 11th, 12th, and 13th lever drivers in the third row of meshes, during the making three courses of meshes, by which means such spaces are left unworked; the gymp threads are then laid in from the 13th to the 9th meshes of such unworked patches. These patches are now completed. The other set of carriages which have worked the three rows of meshes a-head, are now to stand still till the work (whether of net, or of finings, or both,) is completed by catches A, C, operating for three courses of meshes on the lever

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drivers, which have been missed in working the three courses of meshes in the other part of the bobbin-net. The gymp bar shogging one mesh each course to bring back the gymp threads from the 9th to the 13th mesh: this produces what in the trade is termed "turning back the gymp threads." It should, however, be observed, that for this description of working so many of the lower points, a stump must be made moveable, to be thrown out of the way of the threads of such patches when they are left unworked. The Patentee remarks, that he may perhaps very correctly illustrate this part of his description by observing, that what he has above given may be said (if speaking of music) to be a scale of notes, the result of arranging and combining such notes depending on the taste of the composer.

Suppose that it is now desired to allow eyelet-holes to form at every tenth mesh across the width of the piece of bobbin-net, in this case no catches A, C, are to be placed on the cylinder opposite every one of the lever drivers at each tenth mesh; by which means those lever drivers will be missed, the cylinder in no way acting on the lever, but the carriages opposite; such tenth drivers will remain in the front bolts *a*, during the first three motions, and thus eyelet-holes will form. The working of the machine, in other respects, is the same as that described for making plain net; and it will be evident to every lace-maker, that in case an open space be left in every other catch C, and there be no catches A, in the way all around the cylinder opposite certain lever drivers, so that in its revolving it in no way interferes with such tenth (or other determined) drivers, excepting for making the bobbin-net, the width of the lace will be divided into breadths at those places.

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From the foregoing description, a workman will be able so to arrange the various parts as to enable him to make use of the 'improved machine, and produce figured bobbin-net of an improved manufacture, changing his patterns with great facility, owing to the lever drivers being each of them capable of performing any part of the process,' and to be varied from performing one particular process to another: thus at one moment any determined number of the lever-drivers may be acting to produce the plain parts of the bobbin-net, whilst others are performing the figure of the ornamental pattern; whilst in other parts of the lace such lever drivers as were working the plain net or ground may become those producing the figure, and such variation may be constantly changed; and such changes may be at every row of meshes, owing to each of the lever drivers acting only within its own space or bolt, and in no way dependant on its neighbour.

Having thus described the nature of his invention, and the manner of constructing the same, with an arrangement of movements suitable for carrying it into effect, and having also described the manner of working the same, the Patentee states that he is aware that additional combs or bolts have been before used in lace-machines, but in such cases they have been for different purposes to that for which he now employs the additional set of carriages with their bobbins; for in those instances the warp-beam, and ordinary warp-threads, and their guides, have been retained.

The Patentee also states, that he is aware that in some machines, such, for instance, as the pusher machines, separate pushers (but of a different construction to his lever drivers), which are not placed on a moveable pusher bar as heretofore, with respect to common

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pushers opposite certain selected carriages, which separate pushers are at times moved out of the way, in order to admit acting on their carriages when it is desired to make breadths, or when eyelet-holes are to form; but in these instances the carriages are worked by moving pusher bars, carrying the whole of the pushers; that is to say, those cast in their leads, as well as those separate ones which make those which are broken out or removed from the leads, as is well understood in pusher machines, or machines where pusher bars are used.

The Patentee also states, that he is also aware that cylinders or driving wheels, somewhat resembling that shown and described, have been before used in lace machines for various purposes; amongst others, for actuating separate pushers opposite such places as it is desired to make eyelet-holes, such cylinders or driving wheels being made to move the separate pushers out of the way of the carriages, which it is desired to omit when eyelet-holes are to be produced: such cylinders or wheels being carried by the ordinary pusher bars, which ordinary pusher bars he has dispensed with. The cylinder, as used by the Patentee, has no effect on the lever drivers of those carriages opposite, which at any time it is desired that eyelet-holes should be permitted to form the cylinder, nor any part thereof acting on those lever drivers opposite which eyelet-holes are forming. The Patentee does not claim the use of a cylinder in whatever manner used in a lace machine; nor, indeed, any of the parts separately hereinbefore described; nor in combination, other than is hereafter mentioned and claimed. And with respect to the third feature of his invention, the Patentee states, that he is aware that carriages with

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elongations or guides have been before made, and have been used for supplying and working what is termed lacing threads for lacing breadths together, but have not been used as the carriages for producing the bobbin-net or ornamental figure thereto; he does not, therefore, make any claim to the carriages with guides or elongations, but only to the manner of using them for producing bobbin-net: he states that he would, therefore, have it understood, that what he claims as his invention of an improved machine for making an improved manufacture of figured bobbin-net, or what is commonly called bobbin-net lace, consists in the application of the three following features of novelty:—

First, the dispensing with the warp beam, and consequently the ordinary warp threads and their guides, and supplying their places by an additional set of carriages and their bobbins, and thus working with all bobbin threads, in like manner to making lace on the pillow, as above described.

Secondly, the lever drivers B, one within each space of the bolts *a*, each lever driver being independent of its neighbour, whereby the description of work performed by each of the carriages may be constantly varying in the same piece of figured bobbin-net, as above described.

And thirdly, the application of carriages having guides or elongations for making the net, for the purpose of facilitating the taking up, and also for preventing the cutting of the threads, particularly in working figured bobbin-net, as shown in the drawings; but he does not claim the carriages, or their guides, or their use, for working lacing threads, as above mentioned.—[*Inrolled in the Inrolment Office, March*, 1835.]

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To JOSIAH GILBERT PIERSON, *of New York, in the United States of North America, but now residing in Ludgate-hill, in the city of London, merchant, for certain improvements in the construction of locks, bolts, and latches, to be attached to doors, and other situations where a secure fastening may be required.*—[Sealed 20th December, 1833.]

THESE "improvements in the construction of locks, bolts, or latches, to be attached to doors, and other situations where a secure fastening may be required," consist in several novel features to be adapted to such fastenings, but principally in the employment of a series of peculiarly formed sliding pieces (which are proposed to be called the web of the lock), intended to constitute checks as the wards of a lock; which pieces are to be used for confining and securing the bolt or latch, and preventing its being slidden back by any implement in the absence of the key, which has been fitted and adapted to its particular use.

In the accompanying drawings (see Plate XI.), the bolts and latches are represented in several figures, the parts being detached for the purpose of explaining their particular constructions more perfectly.

Fig. 1, exhibits the interior of a lock, with the improvements adapted thereto: *a, a, a,* is the frame or case of the lock *b*, the tongue of the bolt; and *c, c,* the forked tail of the bolt, with grooves or notches formed in its edges at *z, z, z,* for the purpose of receiving the ends of the legs of the sliding pieces *d.*

One of these sliding pieces *d,* is shown detached at fig. 2, drawn upon a larger scale. They are formed from plate metal, and are all made flat, so as to lay close together, and coincide with each other.

The central apertures of these sliders may be made to correspond exactly in dimensions; but the legs, in that case, must vary in length. They are made to fit on to nibs *e, e,* fixed upon the lock plate, which nibs guide the sliders as they are moved up and down.

Any number of these sliders may be combined; they may be of various thicknesses, and their legs may be of different lengths; but the key which is to move them must be furnished with tappets exactly corresponding with these sliders, in order that the ends of their legs may be all brought into coincidence, so that the bolt may be allowed to slide freely; for when any of the ends of the legs project into the notches or grooves *z, z, z,* then the bolt will be prevented from sliding.

Fig. 3, is the key with the tappets, affixed to a barrel or square rod, and confined by a screw cap at the end.

Fig. 4, represents a series of twenty-two of the sliding pieces, combined, as they would appear in section taken transversely. It will here be seen that their legs being of different lengths, some of them extend outward beyond others.

When the sliders are placed in the lock, as shown in fig. 1, these projecting legs will fall into the notches or grooves *z, z,* in the tail of the bolt, and confine it; but on introducing the key, as in the section fig. 5, and turning the key round its tappets, will act against the edges of the sliders in the central aperture, and by raising some, and depressing others, bring the ends of the legs of all of them into a coincidence with the internal edges of the forked tails of the bolt, thereby allowing the bolt to be freely slidden back, as in the act of unlocking a door.

It will be evident that if any of these sliders were

shifted from their relative situations, and placed in other situations, that the tappets, as fixed upon the key, would not then move the whole of them in such a way as to bring the ends of all the legs into coincidence with the edges of the bolt; or if a key were introduced, the tappets of which varied in the slightest degree, either in height or thickness, from that which had been fitted to the sliders, as arranged in the lock, the legs of the sliders would then stand at different heights, some of them remaining in the grooves or notches *z*, which would, of course, prevent the bolt from being slidden.

The tappets upon the key are all capable of being shifted by unscrewing the cap piece; therefore, by altering the relative situations of the sliders in the lock, and also of the tappets upon the key to correspond, a great variety of changes may be produced in the security of the lock; and this variety of changes may be increased almost *ad infinitum* by slight alteration in the lengths of the several legs of the sliders, and in the thicknesses or heights of the tappets, as will be evident upon considering the principles upon which the security is founded. A plate or cap piece should be screwed on to the nibs *e, e*, for the purpose of confining the sliders in their places.

Having thus explained the principle and operation of that part of the improvement which refers to confining the bolt or latch, and preventing its being moved by a picklock or false key, it is only necessary to add, that the tappet key having been applied as described, and the sliders all brought into their proper situations, a tubular key is then to be introduced, for the purpose of turning a tumbler *f*, by which the bolt may be moved.

As a further security to these bolts or latches of locks, or such other kind of fastenings, the face plate of the case of the lock may be secured in its place by the bolt itself, and be prevented from being removed, except when the bolt is brought into a particular situation, which can only be done by first introducing the proper tapetted key, and then moving the bolt to the precise place.

The interior of the lock may, by these means, be rendered perfectly inaccessible, modes of doing which admit of many variations; it will, however, be sufficient to show one method of effecting this object.

The box *a*, *a*, or case of the bolt or lock, fig. 1, is to be secured, in the first instance, on to the door, by screws passed through holes at the corners, the face plate, fig. 6, having been removed, to allow of the screws being introduced. After the lock has been thus fastened to the door, the face plate is put on, and secured in the following manner: *g*, *g*, are hook pieces, projecting from the face plate, which hook pieces are intended to pass through the notches *y*, *y*, in the tail of the bolt, and catch under the flanges *i*, *i*, upon its edges; *h*, is a dovetailed piece of metal, also formed on, and projecting from, the face plate, which piece fits into a corresponding dovetailed notch in the front edge of the box or frame at *k*, *k*; which piece *h*, keeps the bolt down in its proper situation. A screw is then passed through the face plate into the box of the lock, as at *m*. The security of fastening, however, in nowise depends upon this screw, as the notches *y*, *y*, having been slidden away from the hooks *g*, *g*, the flanges *i*, *i*, on the edges of the bolt, hold the plate securely.

It will be seen that, by this arrangement, the lock or bolt cannot be removed from the door by any person

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without having possession of both keys. Fig. 7, represents the outside of the lock plate.

As a still further security to bolts or latches of door locks, or such other kind of fastenings, the staple or box which is to be fixed upon the door jamb to receive the tongue of the bolt when locked is constructed, as shown in the several figures following, consists of two separate parts, which are combined, so as to form a box or staple, which cannot be removed from the door jamb without the door being first unlocked.

Fig. 18, is a perspective representation of the box as it would appear when put together with its plate. Fig. 19, is a detached view of the box apart; and fig. 20, is a similar view of the plate, or that piece which is to be fastened on to the door jamb: a, is a metal plate, which is first secured on to the door jamb by screws passed through the countersunk holes *b*, *b*, *b*; this plate has a dovetailed rib *c*, *c*, which forms a groove at each end, and also at the back part, if necessary. The box part *d*, has corresponding dovetailed edges *e*, *e*, which fit into the grooves of the plate at *c*, *c*; and when in its place the box covers the heads of the screws used to fasten the plate to the door jamb. The box may be fixed in its place by screws, passed through the holes *f*, *f*, and taking into the plate, which screws are merely to prevent the box slipping out of the groove when the door is open.

As it may be desirable to close the aperture through which the tappeted key is inserted, a sliding shutter is adapted to the bolt, as shown at *n*, in fig. 8, which represents the interior of a lock with the shutter, which is to be slidden backwards or forwards before and after locking and unlocking the door. This shutter may be moved by the second key, which turns the tumbler *f*,

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for throwing the bolt in or out. Fig. 9, is a similar view of the interior of the lock, the bolt being removed, and showing the sliding shutter *n*, in its place.

Fig. 10, is a representation of the sliding shutter detached. In this instance there is a second tongue *o*, placed upon the axis of the tumbler *f*, at nearly right angles to the bolt or tongue *f*, which slides the bolt; the former moves in the open rectangular space of the sliding shutter, and is kept in its proper position by guide studs and the bridle piece which carries the studs *e*, *e*.

When the bolt is to be withdrawn, the tubular key is applied and turned round, until the tongue *o*, has withdrawn the sliding shutter *n*, from over the tappet keyhole in the plate of the box; then the tappeted key is to be introduced and turned, so as to release the bolt, as before explained; and after this is done, the tubular key is turned still further round when the bit or tongue of the tumbler *f*, will move the bolt back and unlock the door.

After the door has been unlocked, and the tappeted key has been withdrawn, the tubular key is to be turned further round, so as to bring the sliding shutter over the tapetted key-hole, as shown in figs. 8, and 9.

As it may be thought desirable to adapt one key which may be able to move both the sliding web pieces, and also throw the bolt, a construction to effect this object is represented at fig. 11, which shows the inside of the lock.

Fig. 12, is the bolt detached, and fig. 13, represents the key. To the bolt is attached or connected a piece *p*, which is to be acted upon by a tumbler *q*, mounted in the back plate of the case; this tumbler is moved by the broad or double tappet *r*, upon the key.

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When the bolt of the lock is to be slidden, the key must be introduced, and turned one quarter of a revolution—that is, until the bolt is released; and by continuing to turn the key, the tongue of the tumbler will be brought into operation upon the piece *p*, and thereby slide the bolt.

In order to prevent the lock being injured in any attempt to force the bolts or latches back by turning the tumbler when the bolt is confined by the sliders, a contrivance may be introduced which shall allow of the axle of the tumbler going round, when extraordinary force is applied, without the tumbler moving. One mode of doing this is shown in the detached fig. 14: *a*, is the axle of the key; *b*, the bit or tumbler, which is kept up against a collar *c*, on the axle by the spring *d*, acting between it and the plate of the lock. A nib or sort of clutch *e*, locking into a corresponding notch in the cylindrical part of the tumbler, holds the two together; but on any attempt being made to turn the tumbler round when the bolt is not released, the spring *d*, will give way, and allow the nib of the axle to recede and come out of the notch; and hence the axle will be enabled to turn round without acting upon the tumbler.

Another mode of performing this object is shown at fig. 15, where the same effect is produced by friction upon the axle of the tumbler or bit: *a*, is the axle; *b*, the bit, which, in this instance, has a recess cut in its side at *c*; *d*, is a spring clip or piece which fits into this recess, and is screwed to the side of the bit for the purpose of producing a sufficient friction upon the axle to hold the tongue or bit firmly upon the axle, excepting when any forcible attempt should be made to unlock the door while the bolt is secured, when, by the

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extraordinary force exerted, the friction of the surface will be overcome, and the axle slide round.

The same effect may be produced with the tumbler or cam, which throws the bolt at the same time that it moves the sliders, as in fig. 11.

This mode of producing that object is shown in fig. 16: *a*, is the tumbler or bit, which is confined between the friction plates *b*, *b*, which are also intended to embrace the back plate of the lock. Should any attempt be made to move the bolt when it is not released, the plates *b*, *b*, would turn round, leaving the tumbler in a quiescent state. Having now described the various improvements applicable to bolts, I have only to show the adaptation of the sliding web pieces to spring latches for doors. Fig. 17, is a representation of the interior of a spring lock, in which the sliding web pieces are shown with only two projecting legs.

When this construction of fastening is used only as a spring latch, then the legs of the sliders or web pieces *d*, are withdrawn from the notches *z*, *z*. The bolt being now slidden back a short distance, the ends of the legs will stand in the elongated notch *x*, *x*, by which means the bolt will be free to move backwards and forwards without interfering with them.

When it is required to secure this construction of latch, the sliding web pieces are to be withdrawn from the elongated notch *x*, and the bolt be moved outwards, until the notches *z*, come opposite to the ends of the legs of the sliding web pieces, when they may be turned into the notches by the tappet key, and the bolt thereby secured.

Having now described the particular construction of the several parts of the improvements applicable to

bolts and latches for fastenings, which form the subject of my invention, I desire it to be understood that I claim particularly the adaptation of the changeable sliding web pieces for locking or confining the bolts or latches: also in rendering the interior of the lock inaccessible, by securing the face plate through the agency of the bolt and key, and in the manner of constructing the staple which receives the tongue of the bolt, and in the general arrangement and construction of the other improved parts, when used in connexion with the said sliding pieces.—[*Inrolled in the Rolls Chapel Office, June*, 1834.]

Specification drawn by Messrs. Newton and Berry.

To LEMUEL WELLMAN WRIGHT, *of Sloane-terrace, in the parish of St. Luke, Chelsea, in the county of Middlesex, engineer, for his invention of certain improvements in machinery or apparatus for refrigerating fluids.* —[Sealed 9th August, 1834.]

THIS invention of improvements in machinery or apparatus for refrigerating fluids, consists in the adaptation of certain well known principles, through the agency of machinery, whereby the Patentee is enabled to reduce the temperature of fluids even to the congelation of water into ice.

It is well known that atmospheric air, if compressed in a close vessel, will give out a considerable portion of its caloric, which will be taken up by the surrounding conducting bodies; and that if this volume of compressed air be then liberated and allowed to expand, it will take up, by abstracting from any material with

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which it may, come in contact, a quantity of caloric, equal to that which it had parted with in its previous compression. Now the subject of this patent is, the means or mode of bringing these principles into operation through the agency of volumes of atmospheric air, acted upon by machinery, for the purpose of abstracting the caloric or heat from fluids in order to reduce their temperature, and in the case of water causing it to be congealed into ice.

The accompanying drawing (Plate XI., fig. 21,) represents a section taken vertically through a machine or apparatus constructed for the purpose of refrigerating water, and converting it into ice: *a, a,* is a hollow cylinder, accurately bored as the cylinder of a steam-engine; *b,* is a piston formed by two discs pressed together by a nut and screw, with a leather cup between them; the lower disc is accurately fitted to the interior of the cylinder; the upper disc, which is a trifle smaller, is made tight by the edges of the leather cup.

The rod by which the piston is raised and depressed in the cylinder is shown at *c, c.* The lower part of this rod has a screw thread formed round it, which works in the boss of the bevel wheel *d.* This rod slides through the stuffing box *e,* at the lower end of the cylinder, and also through the cross rails *f,* and *g,* between which the boss of the wheel *d,* works. A bevel wheel *h,* of half the diameter of *d,* turns upon a pin fixed in the side frame, and is driven by a winch *i.* By the two bevel wheels *d,* and *h,* gearing into each other, the rotation of the winch gives rotary motion to the wheel *d,* and by so doing, causes the rod *c,* and with it the piston *b,* to be raised or depressed within the cylinder.

A lateral passage *k,* forms a communication (when the piston is situate in the lowest position, as shown in

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the drawings,) between that part of the cylinder which is below the piston, and that part which is above it. This passage is furnished with a stop cock *l*. A cap plate *m*, accurately fitted to the top of the cylinder with an air-tight joint, is placed in the position shown, and pressed down by a screw *n*. The tube of a funnel *o*, containing water, is inserted into this cap plate *m*, of the cylinder *a*; this tube has a stop cock *p*.

A rod *q*, connected at one end to the crank arm of the stop cock *p*, of the funnel, and at the other end to the crank arm of the stop cock *l*, of the passage *k*, causes these two cocks to open and shut simultaneously. A conical valve *r*, in the bottom of the cylinder is to admit air during the rising of the piston.

A dish *s*, is mounted on the top of the rod *c*, for the purpose of receiving the water let fall from the funnel. A sieve or fine strainer *t*, is attached to the under part of the cap plate, in order to distribute the water let out from the funnel, and cause it to descend through the cylinder in form of a shower.

The cylinder may be enclosed with a jacket *v*, *v*, containing water, or any other cooling material, for the purpose of taking up and conducting away the heat which it has given out by the condensation of the air within the cylinder, and taken up by the surrounding metal.

In order to make ice in this apparatus, the piston must be first raised to the top of the cylinder by the operations of the winch *i*, and bevel wheels *d*, and *h*, acting on the screw of the piston rod *c*. The cap plate *m*, must then be securely fixed air tight, and the required quantity of water placed in the funnel. The winch *i*, being now turned so as to bring the piston to the bottom of the cylinder, as in the figure, a vacuum will

have been produced within the cylinder above the piston, and the volume of air below the piston will have become compressed into—say about a twentieth part of its original bulk, thereby causing a considerable portion of the caloric or heat which it contained to be given out and taken up by the material of which the cylinder and piston is constituted, and so be conducted away.

The cocks *l*, and *p*, are now to be opened by the hand of the operator, applied to the rod *q*, by which means the compressed air will be allowed to pass through the passage *k*, and expand itself in the upper part of the cylinder, being at a much lower degree of temperature, or with a smaller quantity of caloric in the volume than it before possessed in its uncompressed state; at the same time the water having been also allowed to pass from the funnel into the sieve, and to fall in a shower within the cylinder, the caloric of the descending water will be taken up by the expanded air, in consequence of its diminished temperature, or deficient state, and a congelation of the water into ice will be the immediate result.

Instead of the vessel of water surrounding the cylinder, a blowing machine may be employed to drive a current of air between the jacket *v*, and the cylinder *a*, for the purpose of driving off the heat; and in that case it would be desirable to coat the outer part of the cylinder with some fibrous material, as linen cloth, and to moisten it with a small quantity of water in order to promote evaporation. The same principle is available to the operations of refrigerating in general for various useful purposes, and may be applied in several ways and in different forms and constructions of machinery, in which the atmospheric air may be compressed in reservoirs or receivers by any of the known means, and

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allowed to pass off through passages into exhausted vessels, there to expand and to take up, from any substance with which it may be in contact, the caloric, that it requires to restore it to its former temperature. I therefore desire it to be understood, that I claim the adaptation of any machinery or apparatus in which the above described mode of refrigerating or cooling fluids of whatever kind is employed.—[*Inrolled in the Rolls Chapel Office, February*, 1835.]

Specification drawn by Messrs. Newton and Berry.

To PETER FAIRBAIRN, *of Leeds, in the county of York, mechanist, for his invention of an improved method of preparing, slivering, or roving hemp, flax, and other fibrous substances, for spinning.*—[Sealed 23d December, 1834.]

THIS invention consists, first, in submitting the material operated upon to moisture, by the application of a liquid as it passes from the drawing apparatus, and after having been saturated with the liquid, to evaporate the moisture from the material, in order that the fibres may be made to hold together without twisting, by the adhesive property of the gummy matter contained in the liquid, or natural to the fibres themselves; in which dry, adhesive state of the fibres, the roving may be lightly wound upon a bobbin ready for the future operation of spinning.

In the employment of this process, for the purpose of partially cementing the untwisted fibres of the material, together in the form of consistent roving, the Patentee does not intend to confine himself to any particular

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construction of machinery; but for the better explanation of his improved method of preparing, slivering, or roving of hemp, flax, and other fibrous substances for spinning, has, in the drawing hereto annexed (Plate XI., fig. 22,) exhibited a diagram of an arrangement or apparatus which would answer the purpose: A, A, A, represents the main framing of the machine; B, the drawing roller, above which is C, its accompanying pressing roller.

The drawing roller B, may be of any convenient size, and running in water; it is best made of brass, and fluted, in order to raise a greater quantity of moisture, and thereby more thoroughly to saturate the fibrous substance. The pressing roller C, may be of wood, or any other suitable material; and it is to be weighted or pressed upon the drawing roller B, by levers, springs, or any other well-known means: D, represents a trough, containing water, or other liquid, which is to be constantly kept at the same height, and fed through a small pipe from a cistern or reservoir at any convenient distance. The drawing roller B, should revolve in the trough D, immersed nearly up to its axis in the liquid, and it is intended that as it revolves a sufficient quantity of the liquid shall be raised to thoroughly wet the material in the bite or point of contract between the drawing roller B, and the pressing roller C, the air being expressed from the material by the pressure of the two rollers.

Through a revolving tube E, the roving or sliver is intended to pass from the drawing roller B, to the drying cylinder F, which drying cylinder is to be heated by steam or otherwise. The roving is pressed against the periphery of the drying cylinder by a roller G, of iron, brass, or other fit material, sufficiently heavy to draw the

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fibrous substance tight, in order to stop the centrifugal motion, which the roving would acquire from the rapid revolution of the tube E, through which it passes.

From the drying cylinder F, the roving (represented by the faint line) proceeds through a guide to the cop, bobbin, or spool H, which is intended to ascend and descend in the usual way by means of a copping rail, and upon this bobbin the roving or sliver is wound by any of the ordinary modes.

The revolving tube E, is a well-known contrivance, connected with roving machinery, and is employed for twisting and untwisting, by its rotation, any roving or sliver that may be passed through it. It may be driven either by means of bands from a revolving cylinder, or any other well-known mode. The velocity of the tube E, relatively to that of the drawing roller B, and the drying cylinder F, must be regulated by the substance of the roving to be produced. The quantity of twist and countertwist to be given to the roving by this tube, may be the same as the twist that would be required for yarn of a similar substance.

The comparative velocities of the roller B, the cylinder F, and the bobbin H, must be so proportioned to each other as to keep the roving or sliver at all times tight, but in no degree to strain it.

It is unnecessary to describe by what mechanism the roving or sliver, after it has been wetted and dried, may be wound upon the spool cop or bobbin, as no particular mechanism for this purpose forms any part of my invention; but I avail myself, as circumstances may arise, of any mode now in use that may be found most convenient for the purpose. It is recommended, however, as being most convenient, that the roving or sliver should be wetted and dried, and wound upon its

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bobbin by one and the same machine, in the way represented at fig. 22.

Having thus described an arrangement of well-known mechanical parts, which are considered well adapted for carrying into operation this new method of preparing, roving, or slivering hemp, flax, or other fibrous substances, for spinning into yarn, the Patentee proceeds further to declare, that the above said arrangement admits of, and will require, various modifications under different circumstances.

Firstly, with regard to the wetting of the fibrous substance of flax and hemp for general purposes, simple water at the temperature of the atmosphere will be found sufficient; but it may on some occasions be beneficial to employ hot water; and moreover, the water, either hot or cold, may, or may not, contain divers matters in solution, such as alkali to dissolve any redundancy of resin in the fibrous substance; or, it may be an artificial size, or solution of gum, or glue, to compensate for any deficiency of natural gum or resin in the material. It may be useful to employ a glutinous solution, or unctuous fluid, when the roving or sliver is made very fine, in order to increase its cohesive strength.

Secondly, the revolving tube *e*, is not indispensable, but is merely useful in preventing any tendency which the roving may have to lap round either of the drawing rollers.

Thirdly, the drying cylinder F, which may be made of any convenient dimensions, may be heated in any convenient way, by heated air, or steam, or hot water, either pure, or holding in solution a salt to increase its capability of conducting heat. In order to increase or diminish the effect of the drying cylinder, the roving

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may be made to lap upon a greater or less portion of its circumference; and, when necessary, it may be passed one or more times round the cylinder, before it proceeds to the bobbins.

The cylinder may sometimes be dispensed with by the use of any other means of drying the roving or sliver, as for instance, by the use of a fan or blast of air.

The total absence of twist in the roving or sliver thus produced, ensures throughout its whole length a uniform capacity for extension in the spinning frame, where it is again wetted, as usual, but a much smaller degree of wetting will suffice. When the roving is very fine, it is sufficient for this purpose that the holding roller alone should run in water: there is no absolute necessity for fluting the rollers, as now practised; and though it may be better to have the metal rollers, especially the holding roller, slightly scratched, for the sake of raising more water, yet, in all cases, the pressing rollers may be plain.

Lastly, having described the tangible means of carrying into practice my improved method of preparing, slivering, or roving of hemp, flax, and other fibrous substances, I do declare that the same doth consist solely in the employment of the above described process, for the purpose of partially cementing the untwisted fibres of the material together into the form of consistent roving.—[*Inrolled in the Rolls Chapel Office, June,* 1835.]

Specification drawn by Messrs. Newton and Berry.

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To PETER ROTHWELL JACKSON, *of Bolton-le-Moors, in the county of Lancaster, engineer, for his invention of certain improvements in hydraulic presses and pumps.*— [Sealed 6th November, 1834.]

THESE improvements in hydraulic presses and pumps apply to that construction of machinery or apparatus, commonly called or known by the name of Bramah's hydraulic press; and consist, in the first instance, in a peculiar manner of forming or constructing the cylinder in which the piston or ram acts, for the purpose of producing the pressing power; and, secondly, in the adaptation of two pistons in the cylinder of the forcing pump, by the joint action of which the water is injected into the cylinder of the press.

In the accompanying drawings, Plate XI., fig. 23, represents the improved hydraulic press in elevation, with the injecting pump also in elevation, connected thereto by a tube in the ordinary way. Fig. 24, is a sectional elevation of the press, showing its internal construction. Fig. 25, is a plan or horizontal section of the press, taken near the bottom of the cylinder; and fig. 26, is a section taken in the same direction above the top of the cylinder; the similar letters of reference pointing out the same parts in these four figures: A, is a solid block of cast iron, constituting the base or foundation of the press; into notches or recesses in the sides of this block the lower parts of the standards or tension shafts B, B, B, are inserted, having shoulders which bear against the under surface of the block. A similar block C, is connected in the same way to the upper parts of the standards or tension shafts B, B, B, which together constitute the frame of the press. These standards or shafts being difficult to manufacture in a sound state, when of

large dimensions, they may be made by combining several rods of wrought iron together.

The hollow cylinder D, D, is formed of metal, turned and bored to its true figure (and which cylinder I prefer to line with sheet copper). In order to give strength to the cylinder, I embrace it with a hoop or hoops, E, E, E, E, made of wrought iron or steel, or any other suitable material; and when I find it desirable to employ more than one series of hoops, in order to give additional strength to the cylinder, I place another series of hoops on the outside of the first series, in such a way, that one hoop may cover the joints or junctions of the two other hoops which are contiguous to it, as will be perceived by reference to the sectional representation of the cylinder in fig. 24. The upper part of the cylinder and of the hoops is embraced by a cap-piece, shown at F, F, F, in fig. 26, which is keyed up tight against the standards or shafts B, by wedges G, G, G, which thereby form a stays, to prevent the cylinder being forced out of its erect position. The stability of the cylinder is further obtained, by passing a strap of metal H, H, H, round the outer part of the standard or shafts B, see figs. 23, and 26, which being held together by half-lap joints and screws, keeps the whole firm.

To prevent the cylinder being raised from its seat by the action of the piston or ram, I fix a collar or a nib I, upon each of the standards, and pass a wedge key between the collar and the top of the cap-piece, as shown at figs. 23, and 24, which prevents the possibility of either the cap-piece or the cylinder rising. This last-mentioned object may however be obtained by perpendicular bolts extending from the base block, or by other means.

In order that the lower end of the cylinder D, D,

which is in connexion with the base block A, may be perfectly water tight at the junction, I introduce a collar of leather, or of metallic packing, as shown in fig. 24; but this packing may be dispensed with, by turning the bottom edge of the lining of the cylinder inward as a flange.

The ram or piston is shown at K, in figs. 23, and 24, being of a cylindrical form, and may be either hollow or solid, as the manufacturer shall consider most desirable. At the upper end of the piston is fixed the plate or follower L, on which the goods M, M, M, are placed to be pressed; the lower end of the piston must be packed round its edge next to the cylinder by a collar of leather, or ring of metal, which may be supported by cross arms J, J, as shown, in order to make the joint water-tight. The water, by which this piston is raised, must be injected into the cylinder by the force pump N, through the pipe or tube O, O, O; the operation of which is well understood.

I now proceed to describe the peculiar construction of the forcing pump. Fig. 27, is a plan or horizontal view of the improved pump; fig. 28, is a longitudinal section of the same in elevation; and fig. 29, is a transverse section in elevation taken through the centre of the pump; the respective letters pointing out the same parts in these last-mentioned figures: *a, a, a, a,* is the cistern containing water; *b,* the tube which conveys the water up to the pump, commonly called the suction pipe; *c,* the barrel of the pump; and *d, d,* two pistons working horizontally, in opposite directions in the barrel, through stuffing boxes, or packed by a ring of metal, or collar of leather, at the end of each piston, as described in reference to the piston of the press, fig. 24.

The admission or foot valve *c,* works in a socket at the under part of the pump barrel, and the exit valve *f,*

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works in another socket at the upper part of the pump barrel, opening and closing the passage *g*, which communicates with the pipe or tube *b*, *o*, *b*, leading to the cylinder of the press, described in reference to figs. 23, and 24.

Rotary motion may be applied through a pinion and wheel (*h*, and *i*, fig. 23,) to the crank shaft *k*, *k*, of the pump, fig. 24, which will cause the crank rods *l*, and *m*, *m*, connected to sliding carriages *n*, and *o*, to work the pistons *d*, *d*, to and fro, in opposite directions. These sliding carriages move upon plates, having either flanges on their sides, to guide the carriage on V-formed grooves at the bottoms of the carriages and on the plates, or any other suitable contrivance, to keep the movements of the carriages in right lines.

The receding movement of the pistons produce the partial vacuum in the barrel which causes the water to flow in from the cistern below through the valve *e*, their approximating movements expressing the water so admitted, through the aperture *g*, and through the pipe *o*, leading to the cylinder of the press, described above. A safety valve *p*, fig. 29, opens a communication for the escape of water, when the pressure becomes too great; which valve is kept down by a weighted lever *q*, shown in fig. 27. When it is desired to discharge the water from the press, the screw valve *r*, is raised, which allows the water immediately to flow through the passage *s*, back into the cistern.—[*Inrolled in the Petty Bag Office, May*, 1835.]

Specification drawn by Messrs. Newton and Berry.

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To DAVID REDMUND, *of the Wellington Foundry, Charles-street, City-road, in the parish of St. Luke, Old-street, and county of Middlesex, engineer, for his invention of an improvement or improvements in the steam-engine.*—[Sealed 18th October, 1832.*]

THIS invention applies to the construction of boilers, and not to the steam-engine, as expressed in the title. The great desideratum in the construction of boilers for generating steam has been to afford the means of exposing the greatest possible extent of surface to the action of the fire, with compactness; and also to obtain the utmost strength of materials and of construction, in order to avoid explosion in the event of the expansive force of the steam within rising beyond that pressure which the boiler is designed to support.

In constructing his improved boiler, the Patentee provides several close vessels, made of plate iron or copper, securely rivetted at the ends, and at the top and bottom, in the way boilers are usually made. The sides of these vessels are fluted; that is, they are made of fluted or corrugated plates, and the vessels are placed side by side, so that the bulging or protuberal parts of the corrugations of one vessel may come in contact with the bulging or protuberant parts of the corrugations of the other vessel, forming cylindrical or elliptical flues between the vessels, for the passage of smoke and heated vapour from the furnace. The vessels are then confined closely together by strong iron braces circumscribing the whole.

* From some unexplained cause, no notice of the grant of this patent issued from the Great Seal Office.—ED.

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The boiler so constructed is then placed over a furnace, the vessels being occupied with water, and the flame, smoke, and heated vapour emitted from the furnace by passing through the cylindrical or elliptical passages, formed by the corrugations between the sides of the vessels, gives that heat to the water within the vessels which causes a rapid generation of steam; and this steam being allowed to pass off by lateral tubes into a steam chamber, is thence conducted to the working cylinders of the engine.

It is obvious that the dimensions and form of such boilers must vary according to the magnitude of the engine to which it is to be adapted, and also to the uses for which it is required; the Patentee considers such a construction of boiler particularly well suited to the purposes of locomotion.

The idea of constructing boilers of corrugated plates, for the purpose of affording great strength, and producing an extended heating surface, has been already promulgated by Dr. Church. Boilers so formed constitute part of the invention of "improvements in apparatus to be employed in the transportation of goods and passengers, &c.," for which he obtained a patent, dated 9th February, 1832: for the specification of which, see vol. ii. of this Conjoined Series, p. 89. In our opinion, it is questionable: however, the present Patentee may modify the construction of his boilers, whether he can employ corrugated plates for the same purpose as that proposed by Dr. Church, without infringing the previously existing patent right.—[*Inrolled in the Inrolment Office, April,* 1833.]

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To MICHAEL DONOVAN, *of the city of Dublin, for his invention of an improved method of lighting places with gas.*— Sealed 6th October, 1830.]

THIS invention consists in giving to certain inflammable gases a luminous power, which they are not found to possess in their natural or pure state. For instance, pure hydrogen gas, though highly inflammable, possesses but slight illuminating properties; it is only when combined with carbon that it becomes available for the purposes of illumination.

The Patentee also mentions carbonic oxide as a gas similarly circumstanced, and also the gas produced by passing water or steam over red hot coke.

In order to give a higher degree of luminous power to these gases, it is necessary to unite them chemically with carbon in a state of vapour; and this is proposed to be done by combining the vapour produced from a combustible distillation of such substances, as turpentine, or the resinous parts of coal tar or naptha.

These fluids, previously to their being applied, must be well freed from acidity, by washing in water containing pulverised chalk, or from ammonia, by acid, diluted with water.

The combination of the hydrogen and the carbon is to take place at the jet or burner, and which is to be effected by causing a small quantity of the turpentine, or other fluid containing carbon, to be led up to the burner by capillary attraction.

Various modes of effecting this object might be resorted to. The Patentee proposes to conduct pure hydrogen, or any of the gases which are to be employed, through tubes from a generator, in any of the ordinary modes, to a jet or gas burner; and to place in imme-

diate connexion with this burner a coil of fine wire, or fine wire gauze,—to communicate the turpentine, or other carbonaceous liquor, to the coil of wire by any convenient means, so that the liquid, rising by capillary attraction, may be evaporated by the heat as it approaches the burner, and there mixing its vapour with the pure hydrogen, give that carbonaceous or illuminating property to the gas which is required.

The Patentee suggests, as a convenient mode, that a cylindrical tube, having many holes perforated through it in lateral directions, shall be placed perpendicularly within the tube, which conducts the hydrogen gas to the jet or burner; that round this tube several folds of fine wire gauze shall be coiled, and that by a cock introduced into the side of the tube, small quantities of the spirit of turpentine or naptha shall be, from time to time, delivered on to the coil of wire gauze, where it will gradually ascend by capillary attraction;—that the pure hydrogen gas shall be allowed to pass up the tube in immediate connexion with the coil of wire gauze, and being ignited at top of the burner, will communicate sufficient heat to evaporate the spirit of turpentine or naptha from the wire gauze, and cause its vapour to combine with the hydrogen gas at the upper part of the burner before it becomes ignited.

In this way, and in any other way that may be found convenient, the Patentee proposes to give carbon or other illuminating properties to pure hydrogen, or any other gas which, though combustible, burns with a dim or pale light, and thus effects his "improved method of lighting places with gas."—[*Inrolled in the Inrolment Office, April,* 1831.]

AMENDMENT OF THE LAWS RELATING TO PATENTS FOR INVENTIONS.

A Bill is now before Parliament, introduced by Lord Brougham, for amending the law relating to Letters Patent for Inventions. This Bill, though falling very far short of the real wants and reasonable expectations of the inventive part of the community, must, nevertheless, be admitted to possess features of great importance in regard to affording legal protection to patent property.

The Bill refers solely to law practice in reference to patents, and is, we presume, the precursor of a more efficient legislation on the whole system of granting and dispensing patent rights, for the encouragement and protection of inventive genius in the various branches of our arts and manufactures.

In introducing the Bill, his Lordship delivered a speech, pointing out its objects, the report of which we copy from the *Parliamentary Chronicle*, as follows:—

"I move to introduce a bill on the subject of Patent Laws. The defects of the law as it now stands are admitted, and there are two courses to be pursued with regard to its alteration. The first course is to effect an alteration of the whole law of patents; to repeal the law from the statute of James downwards, and then to re-enact such of the provisions of the present law as it is desirable to retain, and to enact other provisions for the greater security of Patentees and of the people at large, with respect to patent right, so as to secure the latter from the bad effect of monopolies. There is this objection to that course, that it would be extremely difficult to secure for it the concurrence of all the interests involved in the matter; and there is this further objection, that one of the plans proposed would be likely to entail on the public one of the great evils of monopolies. I will give one instance of this. It is proposed, that, in order to avoid the injustice of keeping Patentees in courts of justice all the fourteen

years of the continuance of their patents, it should be enacted, that when a man had once got a verdict establishing his patent, such a verdict shall be conclusive as against all the world. The consequence of such an enactment would be, that any man could establish a patent—he might get a patent, though there be no new invention, consented to by the Attorney-General *per incuriam* for the brewing of beer or the making of bread, and he could get a friend to institute a colourable suit in a court of law or equity, which might be kept up collusively during the whole of the fourteen years of the patent, and during that time the public would be deprived of the right to dispute his patent, and must suffer from his monopoly. The objection to this course is admitted, and such a proposal is therefore abandoned. There is another course—namely, to remedy some of the defects of the present law, and that is the course which I now propose to pursue. There are three or four leading defects in the law as it stands at present. In the first place, it is well known that if a person took out a patent in respect of five or six different things comprised under one general invention—as in the instance of an invention of a new mode of making painters' colours, if five of these modes were completely successful, but the sixth was not so—is not a useful invention within the meaning of the patent laws, the whole patent would be void—void as much for the five successful things, as for the one unsuccessful. In the same manner, if six things were claimed as original, and it should be proved that five out of the six were so, but that the sixth was not—that it was in use at the time the patent was granted—the patent would be void for all, although it might happen that each of these five things was original and highly valuable, and though the sixth might be comparatively unimportant. In the courts of law and equity, such a patent would be void. This is a great hardship, for the inventor might have made a very meritorious invention in respect of these five things that were proved to be original; yet even for them he would be deprived of all reward, notwithstanding all the labour he had bestowed, and all the expense he had incurred, in discovering and them bringing them

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into use. If he had deceived the Crown in respect of their originality, he would deserve to lose his patent; but he would equally lose it though he had honestly, but mistakenly, claimed all six as original. This has been the case with the man who invented the chain cable, that most admirable and useful invention. Nobody could touch that; but it so happened that he thought he had invented an anchor with a fixed stock, he included it in his patent, and it afterwards appeared that some other person before that time had used one of a similar kind. The whole patent, as well for the chain-cable as the anchor, was declared void. This might have happened with respect to the wonderful inventions of Watt. The whole of these—the condensing contrivances, the parallel motion—that most scientific application of the nicest and most abstruse principles of mechanics—all would have gone for nothing—new, original, and highly useful as they were—had any little part of the patent been bad. This is an evil that obviously requires a remedy. I propose, as a remedy to it, that if within two years from the inrolment of the specification, the Patentee should enter a disclaimer as to those parts of the patent, and should file the same at the Patent-Office, and should insert it a certain number of times in the *London Gazette*, and in some of the public newspapers, and if he should also get a fiat from the Attorney-General, who should examine whether his original claim was innocent or fraudulent, so as to be within the general principle applicable to grants by the Crown; upon that being filed and published it should be conclusive evidence of the Attorney-General having given leave to allow the disclaimer, and to file it; and the disclaimer should be confined in its operation to those parts of the patent which he had disclaimed, and should not affect the other parts of it. The next difficulty is this. A Patentee now stands in this situation, that if the invention is one which relates to a matter that has been but newly introduced, the value of which is but vaguely known, and which requires time for the public to become thoroughly acquainted with it, a considerable period must elapse before the inventor can get a market—a

demand for the invention that would repay him for the cost and labour he has bestowed on the production; and the fourteen years, usually given as the duration of a patent, may pass away, and the patent would expire under the statute of James before the Patentee is remunerated. If, on the other hand, there was a new mode of doing something that related to a matter already in general use, and the value of which was well known, as was the case with the invention of my honourable and ingenious friend, Mr. Howard, he certainly would not want the fourteen years to make the market; but what then?—why, he would become the prey of every pirate—he would be subjected to perpetual infringements of his patent, for the temptation to infringe it is too strong to those who are already engaged in the trade to which the patent relates, and who find out that the patented article enables others who possess it to carry on the trade to much greater advantage, and, in fact, to drive them out of the market; I say the temptation is too strong to such persons to infringe the patent, and secure this new advantage to themselves. In such a case, all in the trade might pirate the invention, and thus rob the inventor of his fair right to remuneration—he would be but one man with one purse against the purses of a hundred others; and it is well known, as my experience has shown me, that stock-purses are not unfrequently made by those who pirate an invention of this kind to harass the inventor with actions in courts of law and equity, and, driving him to despair, to carry off the fruits of his skill and labour. This, however, did not happen to my hon. friend, Mr. Howard, for that gentleman, by the advice of his friends—in fact, I strongly joined in that advice—got all the sugar-refiners, the operations of whose business were affected by the discovery he had made, to join him on the subject of the patent; and assigning to them two-fifths, and reserving to himself three-fifths of the profits, he gave them an interest in the matter, and made them, in fact, Patentees, though by the law against a partnership exceeding a certain number of members, he could not do so in form. But my hon. friend has been enabled to do this chiefly from the circumstance that the

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sugar-refining business is in a few hands. Mr. Watt, notwithstanding his surprising, and to the public most incalculably useful inventions, might have been out of pocket but for a set of circumstances that could not possibly happen in every case. An Act of Parliament extended the period for the duration of his patent; but if it had ceased in the ordinary manner, he must actually have been a loser by it. It would have been better worth his while to have burned his models and discharged his men (as many sensible and sincere friends—Mr. Smeaton, for instance, among others, advised him) than to have gone on contesting the validity of his patent for his extraordinary inventions. It was after the patent expired that Mr. Watt really gained his great remuneration, for then happening to be a better mechanic than his rivals—happening to have the merit not only of inventing the apparatus, but of constructing it in a better way than others, he obtained, in the midst of competition, the command of the market, and thus realised his fortune. There are, however, instances in which persons, to avoid the evils I have mentioned, kept their inventions secret. Such was the case with the medicine long administered by Mrs. Knight's family in scorbutic disorders. They never reduced the discovery to writing, and they insisted always on preparing the medicine themselves; and this excellent medicine was likely to be lost to the world, because if it had been made the subject of a patent, and its advantages thus after a time secured to the public, the interest of the Patentee would not have been sufficiently protected. The same was the case with what was called Stevens's solvent for the stone. To remedy this evil of the patent laws, I propose that if any person shall take out a patent, and shall afterwards advertise in the *London Gazette* and in the newspapers of London, and of the place where he resides, the discovery he has made, and if after that he shall bring an action at law for the infringement of his patent, or any suit in equity for an account in consequence of such infringement, or that any *scire facias* shall be issued to repeal the patent, and that one verdict shall be found for him on any of these proceedings, and that the judge

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who tries the cause shall certify in the usual manner that the validity of the patent had come in question; that, then, in such case, such verdict and certificate shall be given in evidence in any other such action or proceeding by *scire facias*; and if in any such suit or action he obtain judgment, he shall be entitled to treble costs; not as treble costs are taxed now—namely, the costs, one-half, and then one-quarter; but costs to three times the amount incurred in the suit. Another improvement which I shall propose is directed to the same point, and is connected with the same statement of the nature of the evil. I propose that after a certain time has elapsed, and after a certain number of advertisements have been inserted, giving the public an account of the specification, and referring to a place in London, or in the town at which is the residence of the Patentee, where models and drawings shall be open to the inspection of the public, for one month, during the time of the advertisements, and for one month afterwards, there shall be a limitation of the right of a third party to try the question of the validity of the patent, on the score of its originality; so that after eighteen months from the making of the specification, in no action or suit on the subject of the invention shall any evidence of the want of originality in the invention be admissible. The last improvement that I shall propose in the present law is, that after certain notices given, it shall be in the power of the Privy Council, upon application duly made, after hearing the circumstances in support of and against the application, to grant an extension of time for not more than seven years after the expiration of the original patent. These are the leading improvements of my bill. There are others of a minor kind; and there is one, too, which I think necessary to introduce, to guard against frauds now frequently practised—that is to prevent any person who is not really a patentee from putting over his shop the words 'By Patent,' or 'By His Majesty's Royal Letters Patent,' or other words of a similar kind, which have the effect of transferring to him custom as the patentee of an article for which he really possesses no patent whatever. I move that this Bill be read a first time and be printed."

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The Bill, since its introduction into the House of Lords, has in Committee undergone very material alterations and improvements, under the suggestions and superintendence of Lord Lyndhurst. Several of the original clauses have been altogether expunged; some have received considerable pruning and grafting; and several new clauses have been introduced. We give the Bill in its present amended form, but there are still some highly objectionable points which we are endeavouring to get corrected. Much alteration ought to be made to bring even this fragment of the subject into a wholesome and effective working piece of the machinery of patents; but we fear too much correction might endanger the whole; and as there are some really valuable points, it may be advisable to allow the first act of legislation on the subject of patents to pass even with visible objection on the face of it. Parliament having once recognised the propriety of amending this branch of the law, will not then be reluctant to give it a more enlarged and deliberate consideration.

After reciting the Bill, we shall make a few remarks upon the several clauses,* for the purpose of leading our readers to a clear understanding and full consideration of their bearings and probable effects, to which we particularly solicit the attention of the local committees formed in the manufacturing districts, for the purpose of promoting the enactment of a more efficient code of laws relating to patents for invention, and to watch over any measure of that sort which might be brought before Parliament, in order that they may judge of the propriety of petitioning Parliament, to add to, alter, or expunge any of the provisions, if they shall think such a proceeding desirable.

A BILL,

INTITULED

An Act to amend the Law touching Letters Patent for Inventions.

I. Whereas it is expedient to make certain additions to and alterations in the present law touching Letters Patent granted to

* See our Supplementary number.

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authors of inventions, as well for the better protecting of them in the rights intended to be secured by such Letters Patent, as for the more ample benefit of the public from the same: Be it enacted by the King's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal and Commons, in this present Paliament assembled, and by the authority of the same, that any person who hath obtained or who shall hereafter obtain Letters Patent, for the sole vending or using of any invention, may, if he think fit, enter with the Clerk of the Patents, having first obtained the leave of his Majesty's Attorney-General, or Solicitor-General, certified by his fiat and signature, a disclaimer of any part of his said specification, stating the reason for such disclaimer; or may enter a memorandum of any alteration in his said specification, not being such disclaimer or such alteration, as shall extend the exclusive right claimed by virtue of the said Letters Patent; and such disclaimer or memorandum of alteration being filed by the said Clerk of the Patents, and enrolled with the specification, shall be deemed and taken to be part of such specification in all courts whatever. Provided always, that any person may enter a caveat, in like manner as caveats are now used to be entered, against such disclaimer or alteration, which caveat being so entered, shall give the party entering the same a right to have notice of the application being heard by the Attorney or Solicitor-General. Provided also, that no such disclaimer or alteration shall be receivable in evidence in any action or suit pending at the time when such disclaimer or alteration was inrolled; but in every such action or suit the original specification alone shall be given in evidence, and deemed and taken to be the specification of the invention for which the Letters Patent have been or shall have been granted.

II. And be it enacted, that if in any suit or action it shall be proved that any person who shall have obtained Letters Patent for any invention, or supposed invention, was not the real inventor thereof, by reason of some other person or persons having unknown to him invented or used the same before the date of such Letters

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Patent, it shall and may be lawful for such Patentee to petition his Majesty in Council for new Letters Patent, the matter of which petition shall be heard before the Judicial Committee of the Privy Council; and if such Committee, upon examining the said matter, and being satisfied that such petitioner believed himself to be the original inventor, and being satisfied that no other person had publicly and generally used the same before the date of such first Letters Patent, and all the other circumstances of the case, may report to his Majesty their opinion that the prayer of such petition shall be complied with, whereupon his Majesty may, if he think fit, grant such prayer; and the said Letters Patent shall be available in law and equity to give to such petitioner the sole right of using, making, and vending such invention as against all persons whatsoever, save and except such person or persons as did use the same invention before the date of the first Letters Patent, and those to whom he or they may give leave to use the same, any law, usage, or custom to the contrary thereof notwithstanding: provided that any person opposing such petition shall be entitled to be heard before the said Judicial Committee: provided also, that any person, party to any former suit or action touching such first Letters Patent, shall be entitled to have notice of such petition before presenting the same.

III. And be it enacted, that if in any action at law or any suit in equity shall be brought for an account in respect of any alleged infringement of such Letters Patent heretofore or hereafter granted, or any *scire facias* to repeal such Letters Patent, and if a verdict shall pass for the Patentee, or if a final decree or decretal order shall be made for him, upon the merits of the suit, it shall be lawful for the judge before whom such action shall be tried to certify on the record, or the judge who shall make such decree or order to give a certificate under his hand, that the validity of the patent came in question before him, which record or certificate being given in evidence in any other suit or action whatever touching such patent, if a verdict shall pass, or decree or decretal order be made, in favour of such Patentee, he shall receive treble costs in such suit or action, to

be taxed at three times the taxed costs, unless the judge making such second or other decree or order, or trying such second or other action, shall certify that he ought not to have such treble costs.

IV. And be it further enacted, that if any person who now hath or shall hereafter obtain any Letters Patent as aforesaid shall advertise in the *London Gazette* three times, and in three *London* papers and three country papers as aforesaid, that he intends to apply to his Majesty in council for a prolongation of his term of sole using and vending his invention, and shall petition his Majesty in council to that effect, it shall be lawful for any person to enter a caveat at the Council Office; and if his Majesty shall refer the consideration of such petition to the Judicial Committee of the Privy Council, and notice being given to any person or persons who shall have entered such caveats, the petitioner shall be heard by his counsel and witnesses to prove his case, and the persons entering caveats shall likewise be heard by their counsel and witnesses, such counsel not exceeding three if there be more parties than one, and two if there be but one party entering a caveat; whereupon and upon hearing and inquiring of the whole matter according to law, the Judicial Committee may report to his Majesty that a further extension of the term in the said Letters Patent should be granted, not exceeding seven years; and his Majesty is hereby authorised and empowered, if he shall think fit, to grant new Letters Patent for the said invention for a term not exceeding seven years after the expiration of the first term, any law, custom, or usage to the contrary in anywise notwithstanding.

V. And be it further enacted, that any person purchasing from another the property of and in any invention by him made may afterwards obtain in his own name Letters Patent in like manner as he might have done in case he had been himself the inventor, and shall have and enjoy all privileges and rights, in courts of law and equity andelsewhere, which the inventor himself might have had in case he had obtained such Letters Patnet: provided always, that such purchase shall be stated in the Letters Patent to be granted, and also that such purchaser shall produce before

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the Attorney-General or Solicitor-General, before obtaining such Letters Patent, the deed or agreement of purchase: provided further, that in any suit or action touching such Letters Patent brought by or against such purchaser, all evidence which would have been admissible against such inventor if he had obtained such Letters Patent, and been a party to such suit or action, shall be admissible against such purchaser, and that the inventor shall not himself be an admissible witness in behalf of such purchaser in any action or suit: and provided further, that whatever matter or thing would have made such Letters Patent void or voidable in case such inventor had obtained such Letters Patent shall, if proved in any suit or action by or against such purchaser, also make his Letters Patent void or voidable.

VI. And be it further enacted, that in all suits and actions, and for all purposes whatever, the day of presenting a petition for such Letters Patent, shall be deemed and taken to be the date of the granting such Letters Patent, and the grant shall have effect from the date of such petition, from and after the enrolment of the specification, or the performance of any other condition in such Letters Patent contained: provided always, that the term for which the sole right of using and vending shall be granted, shall be recorded from the time of sealing the said Letters Patent.

VII. And be it further declared and enacted, that it shall be lawful for any person obtaining such Letters Patent to sell or transfer to any number of persons, as well jointly as severally, the right solely to use and vend his invention, or may grant license to use and vend the same to any number of persons in the same or in several instruments of license, any law, custom, or usage to the contrary in anywise notwithstanding.

VIII. And be it enacted, that in any action brought against any person for infringing any Letters Patent, the defendant on pleading the general issue shall give to the plaintiff, and in any *scire facias* to repeal such Letters Patent the plaintiff shall file with his declaration, a notice of any objections on which he means to rely at the trial of such action, and no objection shall be allowed to be made in behalf of such defendant or plaintiff

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respectively at such trial unless he prove service of such notice of objection upon plaintiff or defendant respectively twenty-one days at least before such trial: provided always, that it shall and may be lawful for any judge at chambers, on summons served by such defendant or plaintiff on such plaintiff or defendant respectively to show cause why he should not be allowed to offer other objections whereof notice hath not been given aforesaid, to give leave to offer such objection, on such terms as to such judge shall seem fit.

IX. And be it enacted, that in any action brought for infringing the right granted by any Letters Patent, in taxing the costs thereof, regard shall be had to the part of such case which has been proved at the trial, which shall be certified by the judge before whom the same shall be had, and the costs of each part of the case shall be given according, as either party has succeeded or failed therein. Regard being had to the notice of objections as well as the counts in the declaration, and without regard to the general result of the trial.

X. And be it enacted, that if any person shall write, paint, or print, or carve, or engrave, upon any thing made or sold by him, for the sole making or selling of which he hath not or shall have obtained Letters Patent, the name of any other person who hath or shall have obtained Letters Patent for the sole making and vending of such thing, without leave in writing of such Patentee; or if any person shall, upon such thing not having been purchased from the Patentee, or some person who purchased it from such Patentee, or not having had the license or consent in writing of such Patentee, write, paint, print, carve, engrave, stamp, or otherwise mark the word "Patent," the words "Letters Patent," or the words "By the King's Patent," or any words of the like kind, meaning, or import, he shall for every such offence be liable to a penalty of 50*l.*, to be recovered by action of debt, bill, plaint, or information, in any of his Majesty's Courts of Record at Westminster, one half to his Majesty, his heirs, and successors, and the other to any person who shall sue for the same.

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List of Patents

Granted in Scotland from 20th September, 1834.

(Continued from vol. v. p. 229)

To Matthew Bush, of Dalmonach Prientfield, near Roxhill, by Dumbarton, in North Britain, calico-printer, for an invention of certain improvements in machinery or apparatus for printing calicoes and other fabrics.—25th September.

— Amasa Stone, of Johnstone, in the county of Providence and State of Rhode Island, in the United States of America, machinist, now residing at Liverpool, in the county of Lancaster, for an invention of an improvement in power and other looms, used in the weaving of silk, hempen, cotton, woollen, and other cloth.—3d October.

— Thomas Searle, of Coleman-street, in the city of London, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements in boilers for generating steam.—16th October.

— Claude Marie Hilaire Mohnard, of Brewer-street, Golden-square, in the county of Middlesex, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of a certain improvement in looms or machinery for weaving fabrics.—16th October.

— James Jamieson Cordes, of Idol-lane, in the city of London, merchant, in consequence of a communication made to him by a late resident of the United States of America, now deceased, for an invention of a certain improvement or improvements in machinery, for making rivets and screw blanks or bolts.—16th October.

— To James Jamieson Cordes, of Idol-lane, in the city of London, merchant, in consequence of a communication made to him by a late resident of the United States of America, now deceased, for an invention of a certain improvement or improvements in machinery for making nails.—16th October.

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To James Walton, of Sowerby Bridge, in the county of York, cloth-dresser, for an invention of certain improvements in cards, for carding wool, cotton, silk, and other fibrous substances.—23d October.

— Jean Baptiste Mollerat, now residing with Sir John Byerly, at Whitehead's Grove, in the parish of St. Luke, Chelsea, in the county of Middlesex, manufacturing chemist, for an invention of certain improvements in the manufacture of gas for illumination.—24th October.

— Andrew Hall, of Manchester, in the county of Lancaster, manufacturer, and John Slack, the younger, of Chorlton-upon-Medlock, in the said county, putter-out, for an invention of improvements in the construction and working of looms for weaving by hand or power.—31st October.

— Charles Atherton, of the city of Glasgow, engineer, for an invention of an improvement or improvements upon steam-engines.—14th November.

— Joseph Gibbs, of Kennington, in the county of Surrey, engineer, for an invention of certain improvements in wheels for carriages.—19th November.

— Alexander Craig, of Edinburgh, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of improvements in steam-engines.—12th December.

— James Jones, of Salford, in the county of Lancaster, machine-maker, for an invention of certain improvements for making rovings, spinning, and doubling cotton, silk, flax, and other fibrous substances.—5th January, 1835.

— Samuel Garner, of Lombard-street, in the city of London, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of an improvement in the art of multiplying certain drawings and engravings, or impressions.—7th January.

— George Dickinson, of Buckland, near Dover, in the county of Kent, paper-maker, for an invention of an improvement or improvements applicable to making of paper.—7th January.

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To James Couch, of Stoke, Devonport, captain in the Royal Navy, for an invention of certain improvements in ships' channels.—15th January.

— John Johnson, and George Johnson, jun., hatters, in Leith, in the county of Edinburgh, and James Johnson, Alexander Johnson, and Joseph Johnson, hatters, in Edinburgh, in the aforesaid county, for an invention of certain improvements in the manufacture of hats, caps, and bonnets, by machinery, and for rendering the same water-proof.—15th January.

— Samuel Seaward, of the parish of All-Saints, Poplar, in the county of Middlesex, engineer, for an invention of certain improvements in the construction of steam-engines.—22d January.

— William Wright, hatter, North Bridge, Edinburgh, for an invention of a new and improved method of manufacturing hats.—30th January.

— Joseph Ferguson, of Carlisle, manufacturer, for an invention of a certain combination of processes, whereby a new kind of dress or finish is given to certain goods.—2d February.

— Henry Crosley, of Hooper-square, of Leman-street, in the city of London, civil engineer, for an invention of an improved method or process, arrangement and combination of apparatus, with certain agents used or employed therewith, whereby evaporation of fluids and solutions may be effected advantageously; and also for other beneficial purposes, to which the said method or process is applicable, or can be applied.—3d February.

— James Hudson, of Yule, near Rochdale, in the county of Lancaster, calico-printer, for an invention of certain machinery and apparatus applicable in block printing, or silk, woollen, cotton, and other fabrics, and on paper.—6th February.

— Peter Fairbairn, of Leeds, in the county of York, mechanist, for an invention of an improved method of preparing, slivering, or roving hemp, flax, and other fibrous substances, for spinning.—6th February.

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To Alexander Shanks, jun., flax-spinner, in Arbroath, in the county of Forfar, in North Britain, for an invention of certain improvements in machinery, for preparing and dressing hemp, and other fibrous substances.—10th February.

— James Kay, of Pendleton, in the county of Lancaster, flax-spinner, for an invention of a heckling machine of a new construction.—12th February.

— Joseph Jones, of Oldham, in the county of Lancaster, cotton-manufacturer, and Thomas Mellodew, of the same place, mechanic, for an invention of improvements in looms, to be worked either by hand or power, for weaving of plain, corded, or figured fabrics, and an apparatus for better effecting the cutting of fustians, or other fabrics, woven in a diagonal form. —5th March.

— William Aitken, of Aberdeen, in the county of Aberdeen, North Britain, Esq., for an invention of certain improvements in the construction of carriages, to be propelled by animal or other power.—10th March.

— Thomas Alcock, of the parish of Claines, in the county of Worcester, lace-manufacturer, and John Bertie, of Basford, in the county of Nottingham, machinist, for an invention of an improved texture of the lace hitherto called bobbin-net or twist net, and also certain improvements in lace machinery for producing bobbin-net, and for producing ornaments therein.—10th March.

— William Hale, of Colchester, in the county of Essex, civil engineer, for an invention of certain improvements on, or addition to, boilers or apparatus for producing motive power.—16th March.

— Daniel Duff, of Dundee, in the county of Forfar, in Scotland, for an invention of a method of softening, splitting, and preparing hemp and other fibrous substances by machinery, for the purpose of being spun into yarns.—16th March.

— William Hale, of Colchester, in the county of Essex, civil engineer, for an invention of certain improvements in, or on,

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windmills, which improvements are applicable to other purposes.—22d March.

To Philip Augustus de Chapeaurouge, of Fenchurch-street, in the city of London, gentleman, in consequence of a communication made to him by a foreigner residing abroad, for an invention of a machine, engine, or apparatus, for producing motive power, which he denominates a self-acting motive power, and is called in France by the inventor, volant moteur perpetuel.—23d March.

— Charles de Bergue, of Clapham, in the county of Surrey, gentleman, for an invention of certain improvements in machinery for spinning or twisting cotton, flax, silk, and other fibrous substances.—25th March.

— Robert Joseph Barlow, of Radley, in the North Riding of Yorkshire, clerk, for an invention of certain improvements in springs; applicable to carriages and other purposes.—27th March.

— John Sylvester, of Great Russell-street, in the county of Middlesex, civil engineer, for an invention of improvements in apparatus used in the communication or transmission of heat to aeriform, liquid and solid bodies.—27th March.

— Henry William Nunn, of Whippengham, in the Isle of Wight, George Mowbray, and Richard Alabone, both of the town of Newport, in the said island, lace-manufacturers, for an invention of improvements in manufacturing certain kinds of embroidered or ornamented lace.—27th March.

— Samuel Draper, late of Radford, in the county of Notts, but now of Basford, in the same county, lace-maker, for an invention of an improved machine for making an improved manufacture of figured bobbin-net, or what is commonly called bobbin-net lace.—31st March.

— William Newton, of the Office for Patents, Chancery-lane, in the county of Middlesex, civil engineer, in consequence of a communication from a foreigner residing abroad, relating to an invention of certain improvements in preparing fibrous or

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textile plants, either indigenous or exotic, to be used in place of flax or hemp.—3d April.

To James Hunter, of Ley's-mill, Arbroath, in the county of Forfar, North Britain, mechanic, for an invention of certain improvements in the art of cutting, or what is commonly called facing and dressing, certain kinds of stone.—6th April.

— John Day, of York-terrace, Peckham, in the county of Surrey, gentleman, for an invention of an improvement or improvements in the construction of railways.—10th April.

— James Stevenson, of Leith, merchant, and John Ruthven, of Edinburgh, mechanician, for an invention of a method of cutting wood by certain improved instruments.—16th April.

— John Somerville, minister of Currie, in the county of Edinburgh, for an invention of certain improvements in the construction of guns or muskets, and other such fire-arms.—21st April.

— William Bruce, baker, in the city of Edinburgh, in consequence of a communication made to him by a person resident abroad, for an invention of improvements in machinery or apparatus for making ship and other biscuit or bread.—22d April.

— William Morgan, of the Kent-road, in the county of Surrey, Esq., for an invention of certain improvements in steam-engines.—12th May.

— James Aldos, of Clapton, in the county of Middlesex, smith, for an invention of certain improvements on steam-engines. —12th May.

— James Slater, of Salford, in the county of Lancaster, bleacher, for an invention of certain improvements, in addition to certain improved machinery, for bleaching linen and cotton goods.—18th May.

— Alexis Dumoulin, of Leicester-square, in the county of Middlesex, merchant, for an invention of certain improvements in gas-apparatus.—18th May.

— Moses Poole, of the Patent Office, Lincoln's-inn, in the county of Middlesex, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad,

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for an invention of certain improvements on trusses or instruments, for the cure of hernia or rupture.—18th May.

To Robert Whiteside, of Ayr, in the county of Ayr, wine-merchant, for an invention of certain improvements in the wheels of steam-carriages, and in the machinery for propelling the same; also applicable to other purposes.—18th May.

— John Buchanan, of Ramsbottom, in the county of Lancaster, millwright, for an invention of certain improvements in the construction of cylinder printing-machines, used for printing paper, calico, and fabrics.—18th May.

— William Simpson Potter, of Verulam-buildings, in the county of Middlesex, ex-merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of improvements in rendering fabrics water-proof.—18th May.

— James Boydell, of Dee Cottage, in the county of Kent, land agent and surveyor, for an invention of an improvement in machinery or apparatus for moving or towing boats, or other vessels.—18th May.

— Thomas Humphrys, of York-road, in the borough of Lambeth, in the county of Surrey, civil engineer, for an invention of certain improvements in marine steam-engines, which improvements are also applicable to steam-engines for other purposes.—19th May.

EXTRACT OF AN ACT OF PARLIAMENT

For dispensing with the AFFIDAVIT *heretofore appended to a Petition for Letters Patent.*

By an Act passed the 12th of the present month (June), 5th Gulielmi IV. cap. 8, for the more effectual abolition of oaths and affirtions, taken and made in various departments of the State, and to substitute DECLARATIONS in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths and affidavits, it is enacted—Clause X., that whenever any person or persons shall seek to obtain any patent under the Great Seal, for any dis-

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covery or invention, such person or persons shall, in lieu of any oath, affirmation, or affidavit, which heretofore has or might be required to be taken or made, upon or before obtaining any such patent, make and subscribe in the presence of the person before whom he might, but for the passing of this Act, be required to take or make such oath, affirmation, or affidavit, a declaration to the same effect, as such oath, affirmation, or affidavit; and such declaration, when duly made and subscribed, shall be to all intents and purposes as valid and effectual, as the oath, affirmation, or affidavit, in lieu whereof it shall have been so made and subscribed.

XIII. And be it enacted, that whenever any declaration shall be made and subscribed by any person or persons, under or in pursuance of the provisions of this Act, or any of them, in lieu of any oath, solemn affirmation, or affidavit, all and every such fees or fee, as would have been due and payable on the taking or making such oath, solemn affirmation, or affidavit, shall be in like manner due and payable upon making and subscribing such declaration in lieu thereof.

XIV. And be it enacted, that in any case where a declaration in lieu of an oath shall have been substituted by this Act, or by virtue of any power or authority hereby given, any person who shall wilfully and corruptly make and subscribe any such declaration, knowing the same to be untrue in any particular, shall in all cases in which the punishment of perjury would now attach, be guilty of a misdemeanor; and on being duly convicted thereof, shall incur the pains and penalties to which persons are or may be liable for wilful and corrupt perjury; and it shall be sufficient in any indictment for such offence, to allege generally that the declaration therein charged to have been falsely made was a declaration duly substituted in lieu of an oath; and it shall not be necessary to state by what authority, or in what manner, the same shall have been so substituted.

XV. And be it enacted, that this Act shall commence and take effect from and after the 15th day of June, in this present year of our Lord one thousand eight hundred and thirty-five.

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METEOROLOGICAL JOURNAL,

FOR APRIL AND MAY, 1835.

1835.	Thermo.		Barometer.		Rain in inches.	1835.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low.	High.	Low.			Hig.	Low.	High.	Low.	
April						May					
26	45	30	29,70	29,57	,025	11	64	46	29,91	29,89	,025
27	48	26	29,66	29,60	,025	12	63	44	29,85	29,73	
28	51	28	29,80	29,73		13	61	47	29,60	29,48	
29	49	35	29,74	29,60		14	48	44	29,51	29,42	1,175
30	52	39	29,51	Staty.	,275	15	60	44	29,67	29,60	
May						16	65	48	29,74	29,70	,1
1	55	41	29,60	29,54	,4	17	71	45	29,75	29,74	,075
2	54	42	29,73	29,68	,3	18	73	48	29,73	29,71	
3	56	39	29,79	29,77	,025	19	73	50	29,78	29,73	
4	60	43	29,94	29,87	,025	20	68	45	29,89	29,86	
5	56	40	30,02	30,00		21	69	41	30,11	30,08	,05
6	62	45	29,87	29,83	,075	22	73	39	30,08	30,06	
7	62	45	29,91	29,86	,075	23	70	41	30,04	30,00	,025
8	63	43	29,83	29,79		24	74	49	29,98	29,90	
9	67	45	29,89	29,81		25	66	50	29,85	29,73	
10	67	47	29,81	29,74							

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37′ 32″ N.
Longitude 3′ 51″ West of Greenwich.

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THE

London

JOURNAL OF ARTS AND SCIENCES

AND

REPERTORY

OF

PATENT INVENTIONS.

CONJOINED SERIES.

No. XL.

Recent Patents.

To THOMAS JOHN FULLER, *of the Commercial-road, in the county of Middlesex, civil engineer, for an improvement or improvements in machinery or apparatus for making or manufacturing nails.*—[Sealed 27th February, 1834.]

THERE being two distinct kinds of nails used for various purposes, I shall first describe a combination of machinery which is suitable for square-pointed nails; and having explained and described the various parts, the method of combining them, and also their peculiar mode of operation, I shall then describe my method of making flat-pointed nails; flat and square points forming the two kinds most generally used.

Plate XII., fig. 1, represents a plan or bird's-eye

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view of a cast-iron frame 1, 1, to which the principal parts of the machine are attached or combined; 2, 2 is a flat iron plate, upon which is fixed the iron trough 3; the plate 2, 2, and trough 3, have each a long slot or groove made in them, that in the trough being just the width of the nail to be made: the slot or groove is shown at 4.

The slot made in the plate 2, is for the purpose of letting a carrier move backwards and forwards therein: the end of it may be seen at 5.

The use of this slot or groove is to carry the heated pieces of iron into or between the pointed hammers, to be operated upon in the way that will be shown hereafter: 6, 6, represents a pair of horizontal hammers, which move upon short centres or arms shown at 7, 7; 8, 8, are two strong springs made to act upon the tail of each hammer, and throw them open at proper intervals; 9, 9, shows an axis that reaches across the machine; the centres work or turn in brass bearings; the central portion is removed or broken away in order to expose to view another axis 10, that lays immediately below it, and also some parts attached or combined therewith; 11, 11, represents two iron cam wheels, fixed to the upper axis 9; 12, 13, and 14, are three small cams (two only are seen in this figure) placed on the cylindrical surface of the cam wheel 11; these are so placed for the purpose of lifting a hammer (not shown in this figure).

This hammer moves vertically, and is the principal agent employed for tapering the nail on one side or direction: 15, represents a cam fixed on the same side of the same cam wheel: there are three such cams fixed on each of the cam wheels 11, 11; and in those shown at 12, 13, and 14, there is a slight variation in their

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lengths or projections, the first being the shortest, the second is a little longer, and the third is the longest, by which means the first blow struck by the vertical hammer, when forced down by the shortest cam, will have the least effect in reducing or tapering the iron to form the point of the nail. The second cam being longer, wil raise the hammer shaft higher, and the hammer will then be forced down with greater power, and, consequently, produce a greater effect than the first; and the third cam being longer, or projecting further still, will for the same reasons produce a still greater degree of force, and finally effect the object intended, namely, that of producing a square point, and a proper taper at one end of the piece of iron.

The force or power being thus applied will be found to produce the nail exactly similar in quality to those made by a workman with an ordinary hammer, the taper or point being by my method completed by a repetition of blows, a very slight degree of compression being afterwards applied merely to straighten the nail, and place the point exactly in the line that form the axis of the nail: 16, represents the face or upper surface of an anvil, upon which one end of the heated metal lays while it is operated upon by the vertical hammer; 17, represents a carrying wheel, fixed on the lower axis 10; a similar one is fixed on that portion of the upper axis 9, which is supposed to be removed. Each of these carrying wheels have cavities formed in them to receive in each a steel die 18, each die being fixed firmly in its cylinder by two countersunk screws. The external surface of the cylinder and die are each made to correspond; the die, therefore, when fixed in its place, forms part of the cylinder.

In each die a recess is formed of such dimensions and

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shape as will just retain half a nail imbedded in it; and when the two are placed coincident, or exactly opposite to each other, then the nail will lay imbedded between the two; and as they roll on, the nail will be carried forward between them until it is forced into another part of the machinery: 19, is a metal guide, having a hopper mouth at one end to facilitate the entrance of a nail when it is required to enter therein by the motion or action of the carrying wheels before described.

A metal slide is shown at 20, to which the guide 19, is fixed. The slide 20, is moved by two short arms or levers. One end of each is seen at 21, 21, entering two small apertures made to receive them in the slide 20; the other ends are attached to an axis 22. This axis has a lever 23, fixed to it at one end, which is moved by the cam 24, fixed to the lower axis 10; therefore, when the lever 23, is set in motion by the cam 24, the axis 22, will cause the arms 21, 21, to move forward the slide 20, and also the guide 19, to the position shown in dotted lines, until it is sufficiently near to permit the nail to enter; and when the nail is securely deposited therein, the counterweight 25, combining with the axis 22, will draw back the slide, and all the parts combined therewith, to the position shown, when the nail will be projected into a trough Q, of the heading part of the machine by the following means:—

A striking piece is represented at 26, jointed or working on an axis or short pin at 27; 28, is an iron coupling link jointed to the striking piece near 26; the other end has a slot formed in it; and a pin 29, fixed to the slide 20, enters, and moves freely therein. When the slide 20, is driven forward to the position shown in dotted lines, the pin 29, will advance, and push against the

other end of the slot at 30, and then the striking piece 26, will be driven back to the position shown in dotted lines, in which position there will be just room enough for a nail to enter the guide 19; and upon the return of the slide 20, to the position shown in the drawing, the striking piece 26, will, by its sudden return, give the point of the nail a smart blow or tap, and project it into the trough Q, of the heading part of the machine, from whence it will be conveyed into certain parts that will, by their action, crush up a portion of the metal into any shaped head that may be required.

Fig. 2, shows a front elevation of the same machinery: 31, represents an axis, to which the parts are attached or combined that give motion to the carrier 32; 33, is a lever fixed at one end of the axis 31; the other end is jointed to a connecting rod 34, the upper end of which moves in a slide, and is depressed or forced down by a cam 35, shown in dotted lines; and these parts are made to ascend again by means of a counterweight 36, fixed on the end of the lever 33[1], the lever 33[1], being fixed to the axis 31. It must be remembered that in this figure a part of the frame of the machine is removed by which means many of the parts are exposed to view that would be hidden, if such a mode of showing them was not adopted; and some others are shown in section for the same reason; 37, shows the position of the vertical hammer which swings or moves on an axis 38, placed across the machine; the method of fixing this axis will be shown in another figure; 39, represents a counterweight fixed near the end of the hammer shaft or helve 40. This weight brings up the hammer 37, after it has been driven down by the action of the cams 12, 13, and 14, (this effect may also be produced by a spring) which in their re-

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volution raised the inclined plane 41, and caused the hammer 37, to strike the nail in such a manner as to taper one end, and by a repetition of blows produce a square point in the manner before described, the increasing length of the cams producing a more powerful effect at each blow or motion of the hammer.

A cam fixed on the lower axis 10, is shown at 24, this acts on the lever 23, and being attached or connected to the axis 22, it moves the arms 21, 21, (one only of which can be seen in this figure) and shifts the slide 20, and guide 19, at the precise point of time that is required; and by means of this contrivance the guide 19, will be advanced at a proper time to receive the nail, and when it is returned back by the lever 28, rolling down the cam 24, and approaching the axis to it, will cause the striker 26, fig. 1, to give the point a smart blow or tap; and this will project the nail into the trough Q, of the heading part of the machine, where it will have a head formed upon it in the manner to be hereafter described; the position of the striking bar 26, and the pin 29, that gives motion to it, have been already described in the plan of this part of the machinery in fig. 1.

Near fig. 1, 50, represents a piece of iron sufficient to make a nail with, it having been separated from a square rod of iron by shears, or any of the well-known means in common use for cutting rods of iron into lengths. It will be seen that the piece is not cut off perpendicular to the length of the rod, but diagonally; by which means it is tapered for a certain distance, so as to form an inclined plane or wedge of about eight degrees, having a flat point at the extreme end of the inclined plane. This is the first process; and when any number are so prepared, they are put into a suitable

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furnace, and being sufficiently heated, they are then taken out one by one, and placed or laid in the trough 3, fig. 1, of the square pointing part of the machine; and then as the cam 35, fig. 2, shown in dotted lines, comes round, it will depress the rod 34, and cause the lever 42, to advance the carrier 32, which will carry a nail on before it, and place it between the lateral hammers 6, 6, fig. 1, which being closed by the cams 15, 15, on the cam wheels 11, 11, will set the tapered end until the flat point or extreme end of the inclined plane becomes central, or in the line of the axis of the nail, as may be seen on the face of the anvil at 16, the lateral hammers will then be forced open, the cams 15, 15, passing on in their revolutions, and then the springs 8, 8, seen at the tails of the hammers, will force them open, and at that instant the vertical hammer 37, fig. 2, will be forced down by the cam 12, and give a slight blow to that side of the nail that requires to be tapered; and having done so, the vertical hammer will be raised by the counterweight 39; and at that instant the lateral hammers will be so quickly closed by the side cams 15, 15, that they will give the nail a blow on the vertical sides, and by such means keep it in shape; and having produced this effect, they will be again opened, when the vertical hammer 37, will repeat its operation with additional force; the second cam that drives down the vertical hammer 37, being, as before stated, rather longer for that purpose; and when this has effected a greater degree of tapering, and a nearer approximation to a square point, the lateral hammers will be closed a third and last time, which will be all that is requisite, and then being forced open, the vertical hammer will be forced down a third time with still greater effect, and

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this will finish the work that is to be done by the hammers.

The carrier 32, will at this period drive forward another nail, which will, by pressing upon the end of the one recently tapered and pointed, cause it to enter the groove made to receive it in the steel dies let into the carrying rollers 17, see fig. 4, which, as they revolve, will cause it to enter the hopper-mouthed guide 19, which at this point of time will be forced up against the opening or space between the carrying rollers, as shown by dotted lines, and when the nail is placed therein, it will be conveyed to the position shown at 19, in fig. 1; by the action of the levers 21, 21, combined with the slide 20, and at that instant the pin 29, will cause the link 28, to pull the striker 26, forward very quickly, and then it will strike the pointed end of the tapered nail and project it into the trough Q, from which it will be carried into the heading part of the machine, to be completed by having a head formed upon it.

I shall here observe, that if the nail when it leaves the hammers should have the slightest degree of crookedness, it will be set perfectly straight by being passed through the carrying rollers, and from them into the guide 19; the rollers and steel dies let into them being so adjusted as to give a different degree of pressure for that purpose.

Fig. 1, 42, is a pinion fixed on the upper axis 9, this gears into one exactly similar, fixed on the lower axis 10; by these means the two axes 9, and 10, are made to revolve together, and also the carrying rollers fixed upon them; 43, is a cog wheel fixed to the end of the axis 9, this is set in motion by the connecting wheel 44, which turns on the fixed axis 45. The connecting

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wheel 44, is driven by a similar one, attached to an axis or shaft H, of the heading part of the machine; a portion of this wheel is shown at 46. It will therefore be easily seen that these wheels are the means of communicating motion from the heading part of the machine to the pointing part of the machine.

Fig. 3, 47, 47, represents a front elevation of the bridge or carriage that supports the axis of the vertical hammer. This bridge is bolted to the two sides of the iron frame 1, 1; 38, is the axis or shaft upon which the hammer 37, swings or turns. The axis or shaft moves in brass bearings, placed at each side of the top of the bridge, the hammer 37, slides in a recess or mortice formed for it, which may be seen at 48; and the position and mode of supporting the anvil may be seen at 46. Fig. 4, represents an end view of the bridge 47, and the position it assumes when properly fixed on the frame 1, 1, of the machine. Fig. 5, represents a plan of the same combination of parts. Fig. 6, represents a front elevation of the same.

Fig. 7, represents a plan or ichnographic projection of the heading part of the machine to be used in the manufacture of nails: A, A, A, A, A, A, represent a cast-iron frame that supports, and to which the principal parts of the heading part of the machine are attached or combine: B, is a wrought-iron axis, the central part of this is constructed to receive a steel die which is fixed under it; this is used in combination with a similar die placed immediately under it, and in a similar axis.

The lower die and the iron axis to which it is affixed, is capable of rising a small distance, so as to meet or recede from the upper die; and when closed, they are made to hold a small portion of a bar or rod of iron

formed into a nail in a heated state, while it is having a head formed upon it. The construction of these dies, and their peculiar mode of operation, will be explained by figures, to be described hereafter; see the figures of the dies in fig. 8.

In fig. 9, a vertical section of fig. 7, and fig. 10, an end view of the same: D, represents a bridge of cast iron fixed to the frame A, A, at each end by bolts and nuts; its peculiar form and construction will be better seen in another figure, to be described hereafter. In that portion of the bridge seen at E, and under a cover, the sliding header moves, the sliding header is shown at *a*, and the cam that drives it forward to produce the head may be seen at *b*: F, F, and G, G, are two similar bent levers, one of which F, F, is attached or made fast by a key to the axis B; and the other G, G, is fixed or united in a similar manner to another axis placed parallel to and immediately below the one shown at B. The under axis has a recess formed in it, to receive a die similar to the one placed under C; and the two ends of the axis being formed into pivots, move in brass bearings, which are made to slide in perpendicular grooves or recesses formed in the frame of the machine: H, H, in fig. 7, is a wrought-iron axis, having two cams I, and J, attached thereto. When the axis H, is made to revolve either by the handle K, a rigger placed thereon, or any other suitable method or means, these two cams, by means of their peculiar construction, act upon the bent levers F, and G, and either open them or permit them to close as occasion may require; L, shows a coupling plate of iron, made to slide in two horizontal grooves or recesses, formed in each side of the cast-iron frame A, A: *c*, is a projecting loop or coupler cast upon the coupling plate L; a similar one projects

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below the same plate, and its position will be seen by the dotted lines at *d*, each of these loops or projections is made with a recess, and these two recesses receive the ends of the two bent levers F, and G, when they are in a closed position, and hold them firmly while the process of heating is going on: M, is an iron axis, the pivots of which move in brass bearings of the usual description; *e*, is a pallet, shown in dotted lines, welded to or cast upon the lower side of the axis M; this pallet enters a slit or recess, made in the coupling plate L, and moves it backwards or forwards a sufficient quantity to hold the two levers F, and G, firmly, or to release them when it is necessary they should open; *f*, represents a lever fixed to the axis M, by a key and groove in the usual manner; *g*, shows a cam attached to the end of the axis H, and when the axis H, is made to revolve, the cam *g*, will raise or lower the lever *f*, thereby moving the axis M, and pallet *e*, which being combined with the coupling plate L, in the way before described, will produce the desired effect; namely, that of holding the bent levers F, and G, firmly, while the head of the nail is formed.

The combination and peculiar action of these parts will be also seen in fig. 9, representing a vertical section through the centre of the machine, fig. 1; N, represents a cam wheel, fixed on the axis H, this, as it revolves, depresses one end of the lever O, and turns the axis P, partly round, and with it two short levers welded or cast thereto, these may be seen in dotted lines at *h*, *i*; and as the sliding bearings of the axis to which the lower heading die is applied rests upon these levers, they will be elevated until the two dies are so close as to hold the heated iron firmly and immoveably, until the heading is affected. The peculiar arrangement, combination, and

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mode of action of these parts, will be more perfectly exemplified in the vertical section, fig. 9.

In fig. 7, Q, represents an angular cast-iron trough, within which a feeder or carrier moves backwards and forwards to supply the heated pieces of metal into the heading dies of the machine; *k*, is a feeding bar, the lower end is attached to an axis *l*, by which means it can form part of a revolution; the axis *l*, is supported in the standard *m*; the upper end of the bar *k*, is combined with the feeding rod *n*, and the staple *o*, by means of a pin passing through the whole, and upon this pin they all move or turn as upon one common centre; *p*, represents an arm projecting from the feeding bar *k*, upon the end of this arm a friction roller *q*, is placed, which being raised by a striking piece fixed on the bent lever R, sets the feeding parts in motion in the manner to be hereafter described; *r*, is a sliding weight, the use of this is to keep an angular carrier closely in its place, while it is employed in carrying or pushing forward the blank or tapered pieces of iron to be heated: *s*, *s*, are two friction rollers, attached to the lower end of the feeding rod *n*; each of these roll upon a flat surface, formed upon each side of the angular trough Q: *t*, *t* are two parallel inclined planes which permit the weight *r*, to slide up them, and thereby raise the feeder or carrier out of the angular groove, while a heated blank or piece of iron is placed therein to be headed; R, is a bent lever, united at one end to the socket S; *u*, is a curved piece of iron called a discharger, screwed fast to the socket S; this is applied to discharge the nail after it has been finished by the dies in the manner to be described hereafter.

The other end of the bent lever R, has an inclined plane formed upon it, to be acted upon by a cam *v*,

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fixed on the axis H. This cam strikes the lever E, once in every revolution, one nail being completed at each revolution of the axis H. W, shows a cord made fast at one end to the iron staple O; the other end passes over a pulley T, and has a weight tied to it, the power of which is sufficient to pull forward the feeding apparatus, when it is necessary for it to be advanced: *x*, represents a striking rod screwed fast to the coupling plate L: the point of this rod strikes the upper end of the feeding bar *k*, at the instant the feeding apparatus has delivered the heated iron into the dies, and by this means the carrier is removed a small distance from its contact with the point or end of the heated iron, and thereby prevented from cooling it; U, is a weight fixed to one end of the lever *y*, this lever moves on a fulcrum or axis near its centre, and the other end is joined to a part of the bent lever G, G, by which means it is raised at proper intervals for the purpose of letting the end of the bent lever G, G, enter the lower coupling recess *d*, as will be shown hereafter: Y, represents a tappet fixed upon the side of the cam I, or to the axis H; this in its revolution strikes the pin Z, and depresses it; and, as the lower end of the pin Z, is jointed to a bent lever, which is combined with the sliding header *a*, it is by its motion made to draw the header back after it has performed its office, and thereby assist in discharging the nail from the machine after the heading is completed. This part of the apparatus will be more plainly seen in the vertical section of the machine, fig. 9.

If the action of the two cams I, and J, be carefully examined in the drawings where they are represented, it will be found that at certain periods during the revolution one will be advancing towards the two axes to

which the heading dies are combined, while the other is receding, and yet an equal and similar effect is produced by each cam upon each of the bent levers F, F, and G, G, at the same instant of time. This effect is produced by the peculiar curvature of the cams, and the simple method I adopt to produce the curves is as follows.

Fig. 12, H, represents the axis, to which both cams I, and J, are united: X, Y, are two iron arms; one of these is shown in dotted lines, welded or attached in any other suitable way to the axis H. Each of these arms is fitted into a recess formed in the cams I, and J, and when in that state they are made fast, or fixed to the cams by two countersunk screws, as shown in the figure. The same cams may, however, be firmly attached to the axis H, by any of the means usually adopted by workmen in such cases: 1, represents a centre, from which the semicircle or segment 2, 3, is produced; 4, shows a centre, from which another semicircle is produced: the extremities of these are made to fall into each other at 2, and 3: 5, 6, 7, 8, 9, 10, are radii, which, as far as 8, radiate from the centre 1; the others, namely, 9, and 10, radiate from the centre 4: these radii extend beyond the semicircles, and upon these the eccentric portion of the cam I, is formed.

The lower cam J, in this figure, has its proper curvature formed by similar means; but owing to the necessity of making both the bent levers more similarly and simultaneously, the lower cam J, must have its eccentricity fall partly within the semicircle, and partly without, as may be seen by referring to the eccentric portion of each cam: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, represent, in dotted lines, the radii, which are all produced from the single centre 21, and which are to

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be used to lay off the eccentric points, through which the curve of the cam J, must be made to pass.

In this way a templet or pattern may be made, from which a cam, or cams, may be afterwards constructed so near the true curvature, that very little adjustment or alteration will be required when the machine is finally completed.

When square-pointed nails are to be made or headed with this part of the machine, the parts of the machine must be placed in the position shown in fig. 10, and a heated piece of iron, previously pointed, (and which I shall hereafter call a blank,) will be projected into the trough Q, as shown in dotted lines; and then if the axis H, be turned round, the cams I, and J, will, by their revolution, permit the bent levers F, and G, to close until they approach the coupling plate L, sufficiently to enter the couplers *c*, and *d*; and when so closed, the coupling plate L, by the action of the cam *g*, lever *f*, and pallet *e*, will be advanced so as to enclose the ends of the bent levers F, and G, and retain them firmly while the blank is headed. This position of the parts will be seen in the vertical section, fig. 9.

The revolution of the cam I, will permit the bent lever F, F, to close or approach the coupler *c*, and then the weight appended to the cord *w*, will draw forward the feeding bar *k*, also the feeding rod *n*, and all the parts combined at the end of it, and then the carrier will push forward the heated blank until it enters between the dies, which, closing upon it in the way before described, will hold it firmly until the head is formed, which is effected by the cam *b*, driving forward the sliding header *a*, to compress any portion of iron that may extend beyond the dies into the form of a head,

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a cavity being sunk for that purpose in one end of the sliding header.

I shall here observe, that the end of the sliding header, if made of wrought iron, should be case hardened and tempered, and also its whole surface; or it may have a steel punch or header fixed into one end, a proper cavity being formed therein to give the required shape to the head of the nail. The revolution of the axis H, and cam N, attached thereto, will permit the lever O, to roll along the smallest diameter of the cam N, and then the lever O, will, by its action on the axis P, depress the short levers *h*, *i*, attached thereto; and this movement will lower the bottom die, and release the nail now completely finished.

The cam *v*, fig. 10, will, in its revolution, come in contact with the inclined plane formed on the end of the bent lever R, which it will raise rather quickly; and the discharger *u*, combined to the other end or socket S, will have its end forced in between the heading dies under C; and this coming in contact with the point of the finished nail, will discharge or throw it out from between the dies, and, being open, they will be ready to receive another blank, which will be furnished by the revolution of the axis H, H, producing a repetition of the process just described.

In fig. 11, is shown another combination of parts for drawing the finished nail out from the dies: A, represents a standard fixed on the iron plate that covers the sliding header *a* : B, is a lever, that moves on a centre pin, which passes through the upper end of the standard A; C, is a leg, fixed to one end of the lever B: this is lifted or raised by a cam or pin D, fixed to the axis H, and near the cam *b*, that drives forward the sliding

header *a*: E, represents a pendant, that swings on the other end of the lever; the lower end is forked, and this passes over the nail behind the head, and when in that position a cam *f*, fixed to the axis B, will strike the upper end of the pendant E, and then the fork will draw out the nail from between the dies, and it will drop down. The leg C, falling off, the projecting pin or cam D, will raise the forked pendant out of the way of the sliding header, and another nail being headed, the same process will be repeated.

It is not unfrequently found that metal, when rolled, will become crooked; and, in order to avoid such an imperfection, the following arrangement is adopted:—After the head is formed, as shown under the axis B, the bent levers F, G, will be thrown open by the cams fixed on the axis H, before described; and as they open, they will cause the dies to form part of a revolution; and this motion will drive the nail forward, and as it advances it will drive the header back, the cam D, having moved on out of the way; and during the time that this movement proceeds, the nail is completely confined between the header and the dies, by which means it will be prevented from receiving any crook or bend from the rolling that is applied at the taper end; and when the header *a*, is forced back as far as the nail can operate upon it at that instant, the tappet *v*, will strike the pin *x*, (see fig. 5,) which being combined with and operating upon the lever *w*, and pallet *x*, fig. 9, will carry the header so far back as to release the head of the nail from it, and permit it to drop out.

In these dies the square-pointed nail is completed, the tapered point receiving therein a slight degree of pressure, and, consequently, an improvement in its form, just previous to its exit from the heading dies;

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but it should be particularly observed that this pressure is applied upon two of the solid angles, which will produce a great improvement in the quality and shape of the point by condensing the metal in the most favourable direction.

Fig. 8, represents a vertical section of the two axes to which the two heading dies are fixed; they are in this figure shown open, or in the position they assume when ready to receive a tapered nail or blank between them to have a head formed upon it: *i*, represents one of the short levers (before described) that raises and lowers the axis to which the lower heading die is affixed: this lever is shown in a depressed position, and the lower axis down; but in fig. 9, the lever *i*, is represented in its raised position, all the parts combined therewith corresponding, the nail being held firmly between the dies, and diagonally, to resist the pressure of the sliding header.

When square points are to be formed, the pieces of iron prepared are to be laid in the trough 3, fig. 1, of the pointing part of the machine in such a manner that the part to be tapered may lay fair to be struck by the vertical hammer; and for this purpose the sides of the trough are made to stand perpendicular to the bottom, on which the nail lays, and being carried forward in that direction it enters the carrying wheels.

Contiguous to fig. 1, is represented a vertical section of the carrier, and an end view of a heated nail as it lays in the trough ready to be carried into the machine to be pointed: the section is taken by a plane passing through the parts at the dotted lines Y, Y, in fig. 1, supposing the carrier to be in that situation. If the diagonal cut that separates a piece from the rod of iron for the purpose of making a flat-pointed nail be made in

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such a direction as to produce a very thin edge or flat point, there would be a great chance of producing a ragged or torn edge, which could not be well closed or united by any power of the machinery applied to complete the nail; I therefore recommend that the rod of iron should always be cut diagonally at an angle of about ten or twelve degrees, which will leave the point too obtuse for common purposes; but this form must be corrected by heating the pieces so prepared, and then if they are put into the trough 3, of the pointing part of the machine, they will be placed between the horizontal hammers, and the vertical hammer 37, will be forced down, and will set the flat point in a line with the axis of the nail, and at the same time render the taper end more acute; this being effected by fixing the face of the anvil 16, at such an angle to the plane of the horizon as will, by its inclination, produce the desired effect. The nail so tapered will be carried by the machinery into the dies that form the head, and when that process is performed, the point will receive a slight degree of rolling, when the pressure so applied will be found to reduce the point sufficiently.

Care must be taken in forming the cavities in the dies for flat-pointed nails, that they terminate at one end in such a manner that the point of the nail should receive its pressure from the smooth and nearly cylindrical portion of the dies, which will leave the point very smooth, and fit for driving. It will be found that flat-pointed nails made by such means will be equal in quality to those made in the usual way by the hands of a workman.

Machines of this description may be made of any size; and where nails of either larger or smaller size may be required, then machines must be constructed in

proportion; for it must appear evident that large nails cannot be made in a small machine, nor would it be right to employ the powers of a large machine in the construction of small nails.

I hereby declare that I claim as my invention the application of vertical and horizontal hammers, combined for the purpose of tapering and forming the points of square and flat-pointed nails, which, being made to act alternately in the manner and way I have described, will effect that object in a more perfect manner with greater similarity to what is done by hand, and the metal will be less injured in its fibrous texture than by any method hitherto adopted in the various machinery that have been invented for this purpose.

I also claim as my invention the particular method or mode which I have invented of finishing or completing the points of nails by the process of rolling when the pressure is applied upon two of the solid angles, by which means a more perfect square point will be produced than can be effected by any other machinery applied for such a purpose.—[*Inrolled in the Petty Bag Office, August*, 1834.

To Miles Berry, *of Chancery-lane, in the parish of St. Andrew, Holborn, in the county of Middlesex, civil engineer, in consequence of a communication made to him from a foreigner residing abroad, for certain improvements in mills for grinding wheat and other grain, and which improvements render them also applicable to other purposes.*

These improvements in mills for grinding wheat and other grain, apply to a peculiar construction of mill in

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which the grinding or pulverizing of the grain takes place between the periphery of a revolving cylindrical grinding stone, mounted upon a horizontal axle, and the hollow cylindrical surface of a bed-stone, placed nearly in contact with the periphery of the grinding stone, and extending round a segment of one quarter of its circumference.

The improvements consist particularly in the modes or methods of adjusting the situation of the bed-stone, in connexion with, or in reference to, that of the grinding-stone, in order to regulate the grinding or pulverizing of the wheat or other grain into flour, of fine or coarse qualities, as may be required; and though securely and steadily retaining the bed-stone in its proper place while the mill is in operation, yet affording the means of easily removing it when required for dressing or clearing.

The several figures in the accompanying drawings (see Plate XIII.) explain these improvements, and the various methods of constructing the adjustable parts of the mill, the same letters of reference being marked upon corresponding parts in all the figures.

Fig. 5, is a side elevation of a mill, the outer casing of the grinding-stones being removed to expose them to view. Fig. 6, exhibits the runner and bed-stone divested of its frame, and shows the method of adjusting the bed-stone by means of rotary excentrics or cams, which construction is preferred, as possessing considerable advantages over other modes of adjustment, hereafter described: A, is the cylindrical grinding-stone or runner; B, the hollow bed-stone. The grinding-stone or runner is securely mounted upon the axle or shaft *a*, which turns in bearings or plummer boxes upon the top part of the framework *b*, *b*, and is actu-

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ated by any convenient means, as a band passed from a steam-engine, water wheel, or any other first mover, to a rigger, mounted on a separate shaft in a frame placed between two of these mills; from thence the rotatory motion is communicated to the grinding-stone by clutches on the end of the shafts in the ordinary manner, in order to prevent any twist or strain between the bearings of the axle or shaft of the grinding-stone.

The bed-stone is enclosed in a metal casing *c, c*, and is supported at the lower part by the adjusting excentrics *d, d*, mounted on the shaft or axle *e, e*, turning in bearings on the framework; and at the top part by the excentrics *f, f*, mounted upon the shaft *g*, turning in bearings on brackets projecting from the end of the frame, the excentrics working between the hinder part of the casing and the frame *h*. The metal casing of the bed-stone projects over a part of the side of the grinding-stone, and between them a slight packing may be placed, to prevent the escape of the grain or flour from between the surfaces of the stones before it reaches the proper exit.

It will be observed that the part of the metal casing of the bed-stone at *i, i*, having a segment-formed recess, embraces the periphery of excentric *d*, by means of which segment-recess the bed-stone is prevented from shifting, and is kept steadily in its position in whatever situation these excentrics are placed.

It will also be perceived, that by turning round either of the excentrics *d*, or *f*, the inner surfaces of the bed-stone can be brought nearer to, or withdrawn further from, the grinding-stone; hence its suitable position for grinding various qualities of flour may be readily adjusted to the greatest precision required.

Upon one end of each of the shafts *e*, and *g*, are

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placed the two toothed segments *k, k*, fig. 5, the teeth of which take into the endless screws *l, l*, formed upon the ends of the rods *m, m*, which are mounted in proper bearings at the side of the frame. By turning the rods *m, m*, round by means of a key or winch, the endless screws are made to act upon the toothed segments, and thereby cause the shafts and excentrics to revolve. On the sides of the toothed segments small graduations are made, corresponding indices or hands *n, n*, fixed on the framework; by these means, the stones can be brought to any adjustment or distance apart, in order to grind any required quality of flour, the person attending the mills knowing the proper graduations of the scales to be indiced by the fixed hands.

A vibratory motion may be given to the shoot of the hopper, if required, to feed the grain properly, which may be obtained in the manner shown in fig. 5: *o*, is a tappet, placed upon one end of the axle of the grinding stone or runner, which acts upon a lever *p*, turning on a pin as its fulcrum, the reverse end being connected by a link to an arm extending from the vertical shaft *q*, from which shaft another arm also extends, having its end connected to a horizontal adjustable rod attached to the shoot: *r*, is a spring, connected to the horizontal rod, for the purpose of returning the shoot to its former position after it is moved to one side by the tappets and levers. The shoot is suspended by straps, chains, or cords, in the usual way.

For the purpose of regulating the feeding of the grain to the mill, and of crushing it, if necessary, previously to its coming under the operation of the stones, there are a pair of small rollers placed at the bottom of the feeding hopper, with toothed pinions on their axles, taking into gear with each other, which are driven by a band passed from a small drum on the end of the axle

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of the grinding-stone to a pulley on the end of one of their shafts. When it is desired to withdraw the bed-stone, for the purpose of dressing or clearing it, the upper excentrics *f*, *f*, with the toothed segment, must be removed by taking the shaft *g*, out of its bearings; the lower excentrics *d*, *d*, must then be turned round, so as to allow the bed-stone to drop away from the grinding-stone, the small rollers *s*, *s*, then bearing upon the rails *t*, *t*. The bed-stone is then free to be drawn away from the lower excentric, the rollers running along the rails; and after the bed-stone is dressed or cleared, it can be replaced by the same means.

Fig. 7, is a vertical section, taken longitudinally through the grinding-stones of a mill, constructed on the principle above described, but in which the adjustment of the bed-stone is obtained by means of screws in place of the excentrics or cam rollers, the same letters being marked upon parts corresponding in their objects to those of the former figures: A, is the grinding-stone; B, the bed-stone, which, in this instance, is supported at the lower part by the adjusting screw *d*, which turns in a female screw, formed in the cross bar *e*. One end of this screw works in a socket in the lower part of the casing of the bed-stone, and the other end has a square head to receive a key, by which it can be turned for the purpose of raising or depressing the stone. The upper part of the bed-stone is supported and adjusted by the screw *f*, turning in a female screw, formed in the cross bar *g*. By turning the screw *d*, round, the inner surface of the bed-stone can be brought nearer to, or removed further from, the grinding-stone, and the required adjustment obtained.

When it is desired to withdraw the bed-stone, the cross bar *g*, must be detached from the frame, and the screw *d*, lowered, until the rollers *s*, *s*, bear upon the

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rails t, t, and the end of the screw leaves the socket of the casing; when this is done, the bed-stone is free to be carried away, as before described.

Fig. 8, is another similar section, showing a method of adjusting the bed-stone by means of wedges, instead of the screws or eccentrics before described. In this arrangement the bed-stone is supported at the bottom part by wedges d, d, placed in the box e, formed upon the cross-bar of the framework. The wedges are moved by adjusting set screws u, u, working in female screws placed in the sides of the box e. The upper part of the stone is adjusted by similar wedges f, f, and set screws u, u, placed in a box g, formed on the other cross-bar of the framework.

When it is required to withdraw the bed-stone of this mill, the cross bar and box g, must be removed from the framing, as before described, and the wedges d, d, slidden back to the extremities of the box e, which will allow the bed-stone to descend until the rollers s, s, bear upon the rails t, t, when the bed-stone will be at liberty to be withdrawn.

The Patentee, in conclusion, observes, that these mills, when constructed with the capability of adjusting the bed-stone, as above described, are applicable to various other useful purposes; for instance, they may be adapted, when under proper management and adjustment, to removing the husk or shell from hemp and other oil seeds, and preparing them for pressing; also removing the husks from oats and paddy, or rough rice; the indentations on the grinding surfaces being formed according to the description of the work the mill has to perform.—[*Inrolled in the Rolls Chapel Office, March*, 1835.]

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To Benjamin Aingworth, *of the parish of Birmingham, in the county of Warwick, button-maker, for his invention of an improvement in the making and constructing of buttons.*—[Sealed 30th August, 1831.]

In the commencement of this specification, the Patentee describes the particular construction of button invented by Mr. Sanders, of Bromsgrove, having a tuft of cloth or threads at the back forming a flexible shank, for which a patent was granted 13th October, 1825. (See our London Journal of Arts, First Series, vol. xiv. page 148.) He also sets out another construction of button subsequently made by Mr. Aston, of Birmingham, having a flexible shank of cloth, which he considers to have been an evasive imitation of Mr. Sanders' patent. He then goes on to describe his own improvement in the construction of buttons, which forms the subject of the present patent; and consists in covering the entire back of the button with cloth, in order that the button may be sewn on to the garment by passing the needle and thread through the fabric which covers the back part, without the necessity of forming any protuberant tuft, or projecting strings, as heretofore.

Plate XIII., fig. 1, represents the button as made by Mr. Sanders: A, shows the back of the button complete; B, the same as seen edgewise. A shell of a disc form is provided, over which a circular piece of florentine or other fabric is stretched, and a piece with a soft pad placed at the back part. The front covering is gathered in behind, and the whole is confined together by pressing upon the back of the button the ring C, as at *c, c*. Mr. Aston's variation or improvement is shown at fig. 2: A, represents the back of his improved button; B, the same as seen edgewise. A dish-formed shell, as

shown in section at D, is to be provided on the under side, of which the disc of florentine, or other cloth, is to be placed. A padding of soft material with a circular cloth back is to be laid within the dish, and after gathering in the edges of the outer covering of florentine, the ring C, is introduced into the shell, and the edges of the shell pressed inwards by means of dies, so as to cause it to collapse and confine the ring and the edges of the florentine, and allow a portion of the padding and cloth back to protrude through the ring in the form of a tuft.

The Patentee's improvements in making buttons are shown at fig. 3; the back of the complete button being represented at A, and an edge view of the same at B. A dish or shell with countersunk edges is first provided, as shown in section at *a*, and in perspective at *b*. The circular piece of florentine is stretched over the outer surface of the shell, and its edges gathered inwards. A disc of metal shown edgewise at *c*, and its face at *d*, is provided with a dent or recess in the middle; this has a collar of paper, or other suitable material, as *e*, placed upon it, and over this is extended the shank cloth, or disc *f*. The edges of the two discs of florentine or cloth, that is the covering on the face, and also the shank cloth, are then gathered in, and the pieces being pressed together in suitable dies, as usual, the complete button as A, and B, fig. 3, is produced; having the whole of its back covered with the woven material, and which may be readily sewed on to a garment: the dent or recess in the middle, allowing the needle to pass freely, and being without a metal back, the button so made will not be liable to abraid the button-hole of the garment in wearing.

The Patentee, if we understand him right, intends to say, that one of the features of his invention con-

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sists in covering the back part of the flexible shank button with cloth tissue, or other woven fabric, in the peculiar manner described, for the purpose of preventing the edges of the metal discs from rubbing or cutting the front edges of the button-holes, and causing the buttons to lie close to the garment when sewn on. We presume that this external covering of the back of the button is intended to be claimed; but the specification is written in that verbose, prosy, and inconclusive style, that it is difficult to ascertain what are the Patentee's particular claims of novelty. The manner of connecting the pieces which are to constitute the button, and of fastening them together, as described above, forms another feature of the claim as we understand it; viz. closing in the back covering cloth with the back disc and padding within the edges of the cup or shell of the front disc.

These are all the matters that we can collect from the specification; and though the original description is extended over many skins of parchment, our readers will lose nothing of the substance from our condensed version.—[*Inrolled in the Inrolment Office, February,* 1832.]

To JOHN ASTON, *of Birmingham, in the county of Warwick, button-maker, for his intention of an improvement in the manufacture or construction of buttons.* [Sealed 10th July, 1834.]

THIS, like the preceding patent, is for a mode of making covered buttons with a peculiar sort of flexible shank. The description is short, but perfectly intelligible; the button is made by combining several circular pieces

of metal with the coverings of cloth and florentine, as shown and described as Mr. Aston's improved button in Mr. Aingworth's specification, above reported (see Plate XIII. fig. 2). The present improvement consisting in forming the back circular disc with an oval hole in the centre, as shown at fig. 4; in which figures A, represents the back of the finihsed button, and B, its appearance as seen edgewise.

The object of this oval hole in the back disc of the button, is to allow the cloth back to protrude through and form an elliptical flexible shank, which may be more readily sewn on to the garment than the circular tuft which formed the shank in the way Mr. Aston formerly constructed his button, as at fig. 2; the mode of combining the parts forming no part of the present invention.—[*Inrolled in the Inrolment Office, February,* 1835.]

To Jeremiah Grime, the younger, of Bury, in the county of Lancaster, copper-plate engraver, for his having invented a certain method of dissolving snow or ice in the trams or railways, in order that the locomotive steam-engines and carriages, and other carriages, may pass over railroads without any obstruction or impediment from such snow or ice.—[Sealed 21st February, 1831.]

Any ordinary reader, in perusing the above title, would be led to suppose that the Patentee, having invented a certain method of dissolving snow or ice on the rails of tramways or railways, had discovered some new and

peculiar method of effecting that object, but that does not appear to be the case; the word *certain* is not, in this instance, to be taken according to the common acceptation to mean a particular method, but a positive and an unquestionable method of melting ice, namely, by the application of heat.

Considerable inconvenience and danger, no doubt, arises in frosty weather from the accumulation of snow and ice on the upper surfaces of iron railways or tramways, the ice so accumulating raising the surfaces of the smooth iron rail into irregularities, and thereby impeding the progress of the carriages, and occasionally throwing them off the road. To prevent the occurrence of this inconvenience, the Patentee has discovered the advantage of applying heat to melt the ice; and, by way of illustration, points out a method of carrying his discovery into practical operation.

It is proposed that hollow rails shall be employed, which may be heated by currents of hot water, or hot air or gases, or other fluids, passed through them from end to end of the lines. In order to supply the hot water or hot air, furnaces or stoves with boilers or hot air chambers may be placed at convenient stations near the line of railroad, and lateral pipes may be made to conduct the hot water from the said boilers, or hot air from the stoves, to the interior of the hollow rails. Transverse pipes may be laid across the road for the purpose of conducting the hot water or hot air into the hollow rails on the opposite side; and the heat emitted from the hot water or hot air in its passage through the hollow pipes is intended to melt the snow or ice which may have attached itself to the surface of the rails.

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Instead of making the rails hollow on which the carriages run, the ordinary form and construction of rails may be used, and auxiliary pipes placed in close contact with the rails, through which auxiliary pipes the hot water or hot air may be conducted for the purpose of communicating heat to the rails in order to melt the ice.

When the hot-water plan is adopted, the heated current may run by a lateral pipe from the bottom of a boiler at one station, and after passing along the length of railway, be delivered by a lateral pipe into the boiler at the next station, to be again heated, and so on flowing from boiler to boiler along the entire length of the railway. If the boilers are placed at a sufficient altitude, the water may flow, by its gravity, from one station to another; if not, the pressure of the steam within the boiler may force it along the hollow rails. In order to allow the rails to expand and contract under varying temperatures without opening the joints, short tubes are introduced within the hollow rails, which keep the joints closed air and water tight.

The Patentee states, in conclusion, as we before said, that his invention does not consist in any particular apparatus, but in the application of heat to tram-roads or railways, for the purpose of melting snow or ice which may fall upon or lie in connexion with the iron rails.—[*Inrolled in the Inrolment Office, August,* 1831.]

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To Richard Rettfort, *of the Tavistock Hotel, in the parish of St. Paul, Covent-garden, in the county of Middlesex, gentleman, for a certain newly-invented machine or apparatus, called a physiognotype, by means of which a perfect fac-simile of the human countenance can be immediately produced, or the exact copy of a bust or sculptured figure, or of a living or other subject taken, being a communication made to him by a foreigner residing abroad.*—[Sealed 18th December, 1834.]

This invention consists in the construction and adaptation of an apparatus for taking the exact counterpart or concave image of the human face, or of any other form or figure, animate or inanimate, for the purpose of producing from the apparatus a mask, bust, model, or bas-relief, in the perfect form and resemblance of the original subject.

The apparatus is contained in a box, formed as a hollow cylindrical drum, or it may be of any other suitable shape, having two metal plates as diaphragms extended across it. These plates stand parallel to each other, and have a multitude of small holes perforated through them as close together as possible, the respective holes in the two plates being immediately opposite, or in exact coincidence. In these holes, straight metal rods or fine wires, like needles, are inserted, filling up the whole area of the drum, and the wires or needles being all of the same length, and longer than the drum, their ends will exactly coincide, and at their outer extremities resemble a brush. The needles slide freely in the holes of the two parallel plates, and are brought into coincidence by a moveable flat plate at the back part of the drum.

When the instrument is about to be used, the drum

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is suspended by strings, the wires or needles ranging horizontally, and the moveable flat plate being withdrawn from behind the back ends of the wires thus arranged, any slight force, as the pressure of the face against the front ends of the wires or needles, will cause the wires severally to recede, and leave a recess in front corresponding with the projections or form of the face or other figure pressed against it.

In order to fix the wires in the positions which they have assumed by this operation, tallow or bees-wax, or some such material, in a melted state, is to be poured into the drum between the perforated plates, in order to fill that space, and the interstices between the needles; which tallow or wax, when congealed and cold, will hold all the wires or needles firmly, and the recess so produced in the front of the wires will form a mould or matrix, in which the mask, model, or relief of the subject operated upon, may be cast in plaster of Paris, or other plastic material. In order to release the wires from their fixed position, hot water may be poured into an outer casing, or vessel surrounding the drum, the warmth of which will melt the tallow or wax, and allow the needles again to slide freely.

To explain more fully this invention, the Patentee has shown in the annexed drawing, see Plate XVII., several views of one of these instruments. Fig. 9, is a perspective representation of the instrument complete, with the wires projecting out in front, and showing it suspended in a horizontal position by a cord or chain, in order to facilitate the operation of taking the impression, by bringing the instrument into contact with the face or figure intended to be operated upon. Fig. 10, is a geometrical elevation in front of the instrument; fig. 11, is a side view of the same; and fig. 12, is a

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transverse section, taken vertically: *a, a,* is the box or drum, with the metal plates or partitions *b,* and *c,* fixed in it, which, as before stated, are pierced with a multitude of small holes, having straight wires or needles *d, d,* all of a corresponding length, placed in them. These wires project through both plates, the ends of the wires projecting in front through the plate *c,* are intended to take the impression from the face, figure, or other subject. The interior of the drum between the plate is to be filled with tallow, bees-wax, or other such material, through the short tube and cock at *e.* The outer casing *f, f,* is supplied with hot or cold water by the funnel-mouthed cock at *g,* and it is to be discharged at *h.*

In order to facilitate the bringing of the ends of the wires which project through the plate *c,* to an even or coincident surface, for the purpose of taking an impression, the drum *a,* is extended beyond the plate or partition *b,* and in this part of it is placed a sliding follower or flat circular plate *i,* fitting the interior of the drum; to this follower or flat plate is attached a handle *k,* which projects through a hole in the back plate *l.* When it is wished to bring the ends of the wires forward through the plate *c,* the handle *k,* is to be pushed inwards, by which the follower *i,* is moved towards the plate *b,* and all the wires will be simultaneously moved forward through the plates, till the ends project in coincidence a sufficient distance through the plate *c,* the follower must then be drawn back into its former position, as shown at fig. 12, when the instrument will be ready for use.

The tallow within the drum having been melted by hot water, as described, an impression or counterpart fac-simile is produced, by steadily and carefully bring-

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ing the projecting ends of the metal wires into contact with the face, or other subject or figure intended to be copied, when the projecting parts of such face or figure will cause those wires first brought into contact therewith to slide back, until the whole of the front part of the face, or that part of the figure intended to be copied by the instrument, has been touched by the ends of the wires.

The recess produced by the sliding back movement of the wires, caused by the application of the instruments to a human face, is shown in the section at fig. 12, or a recess of any other form would be produced in like manner by pressing the ends of the wires against any other subject or figure.

The instrument having received the impression, is then to be drawn gently away from the face or figure, leaving the impression produced upon the ends of the wires undisturbed. The warm water is then to be let out of the casing, and the instrument allowed to remain steady, until the tallow or other mixture is congealed and cold. This may be facilitated by pouring cold water into the outer case.

On the tallow becoming cold, the wires will be all set and retained in the position they were placed in by the pressure of the face or figure; the instrument may then be safely turned, so as to bring the impression in the ends of the wires uppermost. Plaster of Paris, or clay, properly prepared, is then to be poured into the matrix or recess, formed by the ends of the wires, when a mask or perfect fac-simile of that part of the face or figure touched by the wires will be cast, which may be the final one intended by the artist or modellist, to be used for the bust, medallion, or bas-relief; or from this first plaster, or clay mask, or model, when it is

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properly set, a plaster counter-cast matrix or mould may be formed, from which a second fac-simile plaster, or clay mask, or figure, may be taken in the ordinary way.

It will, of course, be understood, that when a complete bust or figure is intended to be taken by the instrument, its application to the figure in different positions will be required, in order to obtain the fac-simile of all the parts complete.

The hair-drapery, or any other parts not copied by the instrument, may be added in the usual way by the modeler or finisher of the cast of the face or figure, in the manner of finishing such casts, when taken from the living or other subjects by the common plaster counterpart casts or moulds.—[*Inrolled in the Rolls Chapel Office, June*, 1835.]

Specification drawn by Messrs. Newton and Berry.

To RICHARD SINNISTER, *of Manchester, ironmonger, for his invention of an improvement in the manufacture of such pens as are usually made of steel, or other elastic metal.*—[Sealed 23d December, 1834.]

THIS improvement may be described in a very few words; it consists in forming what the Patentee calls "duplicate" pens; that is, steel pens, with nibs and slits at both ends of the piece of metal, by which means two pens may be produced nearly as cheap as the single pen of the ordinary construction.

The Patentee kindly informs us, that his customer will have *two* pens for his money at nearly the same cost as he now pays for *one* of the common single

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metallic pen; and which improvement he thinks will be very useful, for the two nibs may be made of different degrees of fineness. For instance, one end may be formed as a coarse pen for bold writing, and the other as a fine pen for delicate writing, so that a shopkeeper may use the coarser pen at one end for directing a parcel in a bold hand, and immediately reversing his pen, may make an entry in his book with the other nib in a fine hand. This is certainly an exceedingly important discovery!!!

To construct these pens the Patentee tells us that it is only necessary to shape the dies and punch, used for forming the pens, so that they will cut the piece of steel from the thin sheet of metal of the proper shape required for the double pen, the points or nibs of which are to be completed in the ordinary way in which the nibs of single pens are usually finished.—[*Inrolled in the Inrolment Office, June,* 1835.]

To HENRY LISTER MAW, *of South Moulton-street, in the county of Middlesex, lieutenant in our Royal Navy, for his having invented or found out an improved method of using fuel so as to burn smoke.*—[Sealed 20th July, 1831.]

THE Patentee describes the improved method of using fuel, for the purpose of consuming smoke, to consist in placing the fresh fuel intended to supply the furnace on a separate receptacle or grating under the fire-bars, where the heat from the under side of the fire may act upon the fresh fuel, and cause the volatile or gaseous parts of such fuel, which would form smoke if it were

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thrown direct upon the upper surface of the ignited fuel, to evaporate and pass off through the fire above, and there become consumed.

After such fresh fuel has become coked, which will be the effect of thus roasting it, it is to be removed from the under side of the fire, and thrown upon the top of the ignited fuel, and another supply of fresh fuel placed below.

The Patentee states, that this improved method or using fuel may be applied to the common fire-grate for domestic or culinary purposes, or to the furnaces of steam-engines and fire-places of large manufactories. When applied to the ordinary domestic fire-grate, the lower receptacle for the fresh fuel may consist of a drawer or box with a grated bottom, which may be placed under the ordinary fire-grate, and made capable of sliding out or in; and when the fresh fuel has become sufficiently coked, and the fire requires replenishing, the box or drawer is to be withdrawn, and its contents thrown upon the top of the fire: then another supply of fresh fuel may be placed in the box below, and submitted to a similar operation.

When this improved method is applied to the furnaces of steam-engines, or of manufactories, the Patentee recommends a second or lower grating of fire bars to be constructed under the furnace: upon this range of fire-bars the fresh fuel is to be thrown, and it may thence be gradually, from time to time, pushed backward toward the end of the bars as it becomes coked.

At the end of the lower range of bars or coking place, there is to be an opening, through which the coked fuel falls into a box, or receptacle, placed to receive it. This receptacle should be furnished with small wheels running upon a rail, and a handle by which it can so

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drawn to the front of the ash-pit, when the furnace requires supplying with fuel, and its contents thrown upon the upper surface of the fire.

In Plate XIII., fig. 13, represents the section of a furnace: *a*, is the ordinary fire-place, closed by a door in the usual way; *b*, the fire bars, supporting the ignited fire; *c, c*, are the lower or second set of bars or grating, upon which the fresh fuel is thrown through the door *d*, for the purpose of being coked; *e*, is a box or receptacle, placed behind the opening at the back of the coking bars at the end of the ash-pit *f*. This receptacle, as before stated, is furnished with wheels or rollers, which run upon the rails *g*, and may be drawn forward when the fire requires replenishing with fuel, for the purpose of throwing its contents into the furnace; after which fresh fuel may be placed in the first part of the bar or grating *c*, in order to keep up the continual supply of coke.—[*Inrolled in the Inrolment Office, January*, 1832.]

REMARKS ON LORD BROUGHAM'S BILL

FOR AMENDING THE

LAW OF PATENTS.

On reciting the Bill now before Parliament, for amending the law relating to patents (see page 242), we said that we should offer a few remarks on the several clauses, by way of leading the attention of those interested in the subject to a due consideration of their bearings and probable effects. These remarks

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will be confined strictly to the Bill as it is, and not to any other legislative plan which might be substituted in its stead, considering, as we have before expressed, that it would be injudicious to risk certain advantages offered to Patentees by this Bill, for the chances of obtaining a more full and efficient measure, which would at least protract, if not frustrate, that beneficial result now confidently anticipated.

In clause the first, it is directed that a disclaimer of any part of a specification shall be entered with the Clerk of the Patents. We know of no such officer, and see no propriety in creating such an officer. We hope no person connected with any agent for soliciting patents is intended, as that might lead to incalculable inconvenience. The disclaimer should, we conceive, be presented upon petition, referred to the Attorney or Solicitor-General in the ordinary way, and, on being granted, be inrolled with, and indorsed upon, the back of the original specification.

In this clause, under the words *memorandum of alteration*, we should like to see it more clearly defined, whether these alterations are to be confined to what are strictly called *clerical errors*, or whether they are intended to extend to the engrafting of alterations of improvements in the details of the original mechanism: this, if intended, would be exceedingly desirable; but, if so, what is to be the tribunal which shall determine that a subsequent improvement is strictly within the limits of the original invention? This was provided for in a former Bill presented to Parliament by a Consultation Board, as in France.

The part of this clause which directed that application of disclaimer or alteration should be advertised in certain newspapers is very properly expunged, as only

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calculated to invite opposition to the injury of the Patentee.

The second clause of the Bill, as originally proposed, directed that a Patentee should publish in certain newspapers, within a given time, a particular statement of the nature of his invention, and give notice where drawings and models of the same could be seen, in order that any other person might come forward and state that he was acquainted with or had used the invention prior to the date of the patent: which publication, if the invention was not claimed, should be a bar against any future plea that the invention was not original, or valid. The impracticability of this mode of publishing a great part of the inventions which are patented, and the impossibility of establishing the fact of originality by these means, must be obvious. This clause has been expunged altogether, and in place of it a clause to the effect that if any invention patented should be found to have been known or used by any individual previously to the date of the patent, such individual previously possessing the invention shall be allowed still to exercise it. In this case the Patentee is to petition for new Letters Patent, and the conditions are to be, that no person whatsoever shall be allowed to use the same, save and except "such person or persons as did use the same invention before the date of the first Letters Patent, and those to whom he or they may give leave to use the same." The latter part of this clause obviously renders the patent right of no value, and entirely at the mercy of the previous possessor, who may permit the use, *i. e.* grant licenses *ad libitum.*

The third clause awards treble cost to be paid by a defendant on being convicted of an infringement, after

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the validity of the patent has been once established. This may be a very desirable protection to Patentees and prevent improper litigation, if the validity of the patent has been really established on a full investigation of its merits; but if the subject has only been partially considered, and only presumed to be established, the penalty ought not, under those circumstances, to be imposed; the judge is therefore allowed the power of qualifying the taxation.

The fourth clause allows the King in Privy-Council to prolong the term of an expiring patent: a measure that has only been done heretofore under extreme cases, and by express Act of Parliament. There are instances in which such extension of a patent right may be very properly allowed; and, indeed, circumstances may render an extension of the term an act but of common justice.

The fifth clause allows the purchaser of the secret of a new invention or discovery, to solicit Letters Patent in his own name, on acknowledging the sources from whence the invention came. This is a matter in our opinion of very little importance, as the right of a Patentee is as readily transferred to a purchaser after the grant, as before it. There may, however, be some convenience in adopting the proposed new course, and guarded as it is, we see no objection to its enactment. But why may not the original inventor, after he has parted with his interest, be an admissible witness on any legal question referring to the patent? Such is not the case now; Mr. Clegg, the inventor of the gas-meter, was admitted evidence on his own patent in Crosley's case.

The sixth clause proposes that an invention shall have protection against piracy from the day of depositing the petition for a patent, but omits to state any

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limitation as to time, within which the petitioner shall be compelled to apply for the completion of his patent, and without calling upon him to deposit any general plan or preparatory specification of the invention he intends to patent. Without the first of these provisions, the term of a patent may be extended *ad infinitum;* and, in the absence of the second, a petitioner may claim every invention which can be brought within the meaning of his title, up to the time of lodging his specification, which may be some years after presenting his petition.

The seventh clause in the original Bill, empowered the Attorney or Solicitor-General to alter and amend the title of a patent: that is now struck out, and the next clause stands in its place, empowering a Patentee to sell or assign his patent right to an indefinite number of persons, that is, to a joint-stock company. How far this may be desirable we know not; certain it is, that the former limitation, as to the number of persons which should be beneficially interested in a patent, was introduced into a patent expressly to prevent joint-stock companies being formed under the privilege of a patent right.

The eighth clause, formerly the ninth, compels the defendant, in any suit against him for infringement, to give notice to the plaintiff twenty-one days prior to the trial, of any objections which he proposes to take against the specification. This will prevent the necessity of a plaintiff being, as at present, obliged to guard himself at all points by a host of witnesses at an enormous expense, in order to meet any objection which may by possibility be raised by the ingenuity of counsel.

The ninth clause, introduced in committee, empowers the judge, after trying a cause on a patent right, to

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apportion the costs on both sides according to his discretion, having reference to the costs of *each part* of the case, according as either party has succeeded or failed in establishing the several counts of the declaration or objections. On this we say nothing; let the judges take the onerous responsibility, if they think proper.

The tenth clause fixes a penalty upon all assumptions of pretended patent rights. This is a very proper enactment to prevent quackery and imposition. Alas! in what an unhappy position will then be placed many of the present flourishing vendors of patent pills, patent pens, and patent blacking.

ORIGINAL COMMUNICATION.

To the Editor of the London Journal of Arts, &c.

UPON LORD BROUGHAM'S NEW PATENT LAW BILL.

SIR,—His Lordship has at length redeemed the pledge he gave two sessions ago upon his motion for postponing the first Patent Law Amendment Bill, which had passed the Commons. He has introduced to the Peers *his* Bill, which proposes to supersede the *two* intended Bills prepared in the Committee of the Commons. How far the new measure may answer the just expectations of the public, and the real wants of inventors, can be best ascertained by a short comparative notice of the respective details of the several Bills under consideration. It may be necessary, in order to place the subject in a clear light, to allude to the Parliamentary proceedings which preceded the Bills actually prepared.

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After certain petitions presented, setting forth the deficiency and inadequacy of the actual system of patent laws, and of the judicial decisions for the protection of inventors in their property, aided by a strong exposure of the abuses of the patent system generally, communicated by several correspondents to this Journal, a Select Committee of Inquiry upon the law of patents for inventions was appointed by the House of Commons. This Committee made a preliminary report of the evidence and documents presented in the sessions of 1829-1830, "*and they earnestly recommend to the House that the inquiry may be resumed early in the next session.*" Notwithstanding this earnest recommendation of the Committee, as a body, that this "intricate and important" subject of inquiry should be resumed early in the next session, no public nor private call could induce the honourable Chairman, or any individual member of the Committee, to apply in any ensuing session for its reappointment. The consequence has been, that the main end of the appointment of a Committee who were directed "to report their observations to the House" was not accomplished; and instead of a regular Bill framed upon the observations and report of the Committee, we have had as yet only a set of desultory crude Bills presented to Parliament, none of them embodying a complete rational system for the due protection of inventors, and the efficient security of their property. But of these Bills, the one which actually passed through the Commons, and was stopped in the Lords by my Lord Brougham promising som[illegible] thing which should embrace what was deficient i[illegible] [illegible]o- Commons' Bill, was certainly better than oth[illegible] [illegible] the far preferable, in its general provisions, [illegible] [illegible]rs, and ship's new Bill now in progress. It [illegible] [illegible]o his Lordship's [illegible] [illegible]s to their compa-

rative merits we would direct the public attention by a short analysis of Lord Brougham's Bill.

The first section of this Bill allows the Patentee to enter, with leave of the Attorney or Solicitor-General, a disclaimer of any part of his specification, the residue of such specification, after such disclaimer, to stand good. Now this section does not provide for any alteration or amendment of the specification, in case of error, omission, or improvement. All these matters were pretty clearly provided for in the 4th to 7th sections of the rejected Commons' Act.

* Section second of this Act proposes to allow Patentees, upon publishing certain advertisements, to place working models and drawings in some place within their counties, &c.; which course shall, after a certain limited time, preclude strangers from setting up pleas of having used such inventions previous to the date of the patent, &c. The contingency was better and more simply provided for in the 3d section of the Commons' Act.

Third, Lord Brougham's Bill empowers the judge in actions or suits for infringement, scire facias, &c., judgment being in support of the patent, to certify that the validity of the patent came in question before him; which certificate being given in evidence in any other suit or action touching such patent, and verdict or decretal order passing for Patentee, he shall receive treble costs, unless the judge making such second order, or trying such second action, shall certify that he ought not to have such treble costs. This appears to be a useful clause for the due protection of Patentees from vexatious suits after the judicial establishment of a patent.

* This clause has been struck out of the Bill in Committee.

Fourth, provides for the extension of a patent seven years beyond the original term, upon application to his Majesty in Council; after certain preliminary forms complied with, caveats heard, report made, &c. Upon this clause it may be remarked, that the more simple the forms relating to patents for inventions, the better. We have already too much of useless and expensive formalities in the petitions, reports, and bills of the Attorney-General, the sign-manuals, signets, and warrants, and other lumber which embarrass the prosecution of a patent. This clause would make more jobbing expenses and fees. Let the grants of patents for certain subjects requiring long experience to perfect, be twenty-one or twenty-eight years; and let all inventors and improvers endorse their further improvements upon their original specifications at a moderate office charge, which improvements should fall with the expired patent to the public use. This just and equal principle being adopted, the necessary details might be easily framed.

Fifth and sixth, provides for a purchaser of an invention taking out Letters Patent in his own name; the evidence of the inventor not to be admissible in support of the patent, &c. The 1st section of the Commons' Act made a similar provision respecting the purchase, but omitted to exclude the evidence of an interested party in support of a patent. This section is so far good; but unless the enormous charges, fees, and stamp duties upon patents be greatly reduced (the duties should be entirely remitted by Government), it is impossible for a poor inventor to meet the purchaser upon equal terms. Considering an invention as a matter of property—a mental chattel, as it were, in the possession of the inventor—he should, upon every principle of justice and policy, be fully protected in his

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rights, without being obliged to make a considerable outlay for the *public* protection of those rights *before* he can bring his property with safety into the market. The fees and charges in the various stages of a patent for duties or services either absolutely frivolous and unnecessary, if performed, or, in many instances (as may be seen in the Report of the Patent Law Committee of Inquiry), for unperformed antiquated Chancery duties, are absolute robberies, to which inventors ought not to be longer subjected. The second Bill of the Commons ventured gently to touch these sacred Chancery and State mysteries. With a plain reference to Mr. Rotch's evidence of the sales of the Royal sign-manual at one hundred guineas per job "to the upsetting of men's rights," (vide Report, Mr. Rotch's evidence,) the proposed Bill, as drawn and corrected in Committee for the third reading, honestly declared that the sign-manual of his Majesty, as to the warrant and bill of Letters Patent, may be dispensed with without detriment to the public service, and enacted that the Great Seal might be affixed to Letters Patent for inventions upon the authority of the report and bill of his Majesty's Attorney or Solicitor-General. Now this was straightforward dealing with a public nuisance; and for this very section we apprehend the two Bills were strangled—one after delivery, the other in embryo.

The Commons made one omission in this matter; in abolishing the unnecessary duties, they did not expressly abolish the fees. A simple man or green legistor, not versed in these State matters, might incontinently conclude, that where no duties were to be performed, no fees *could* be demanded or received: but the Report of the Committee upon patent practices will show him, that in State and Chancery mysteries there

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may be neither duties to be performed, nor officers to receive fees: and yet that exorbitant fees might be and are demanded, paid to, and received by, certain automatons who represent certain antiquated bags and things, whose *vested* interests are deemed sacred. These impositions were struck at by the Commons' second Bill; Lord Brougham interposed, and forgetting his high character as the exposer of abuses and corruptions, he has framed his bill without one clause that shall touch them at their fountain-head—the Chancery and State officers, whose aids are worse than useless in the common transactions relating to men's property and rights.

I enter my strongest protest against any Bill which does not honestly and fearlessly take away the sign-manuals, signets, privy-seals, and warrants, *and abolish, in toto, all the fees for unnecessary or unperformed duties* in matters of patents for inventions; and I equally protest against any Bill which does not embody the second section of the second Bill prepared by the Commons, which makes one application of the Great Seal of England sufficient for the protection of patent property throughont England, Ireland, and Scotland.

Three separate patents for the protection of a right throughout one "United Kingdom," is truly stated in the preamble to the clause to be a practice, "productive of injury and delay to inventors, *and of great unnecessary trouble and expense.*" This is an honest assertion of facts elicited in evidence before the Committee of Inquiry. Common sense and common justice to inventors equally required the enactment, that *one* patent under the Great Seal should cover and protect inventions throughout one undivided monarchy. Lord Brougham's Bill flinches in this very material point;

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inventors should meet throughout the kingdom, and not rest until they have obtained the insertion of this plain and highly necessary clause in the proposed Bill. I feel it an imperative duty to impress upon the public, the necessity of simplifying, by every possible means, the complicated machinery and attendant expenses of a patent for inventions. Without this, an amendment of technical legal anomalies, and the consequent better security of patent property, however valuable in itself, is inefficient for the mass of inventors; it is only legislating for those who purchase the poor man's invention, instead of enabling the poor man himself to secure his intellectual property, and place it in the public market; it is legislating for the capitalist, against the man of genius and inventive talent—for the rich, against the intellectual mechanic—for upholding of useless formalities and expensive antiquated forms, against the plain principles of sound policy, of public good, and of individual inherent rights in matters of property: in short, such legislation is equally inimical to our commercial prosperity as a nation, and to our unfettered progress in the road of scientific improvement, which only requires for its full development plain and just laws, simple and unexpensive forms of protection.

Lord Brougham's Bill is the production of the mere lawyer, not the comprehensive essay of the philosophic legislator and determn ed reformer.

I am Sir, yours, &c.

VINDICATOR.

The further consideration of Lord Brougham's Bill must be postponed to our next publication.

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SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE.

Rewards adjudged by the Society during the present Session, presented to the respective Candidates at Exeter Hall, 8th June, 1835. Vice-Admiral Sir Edward Codrington, G.C.B., F.R.S., and Vice-President, in the Chair.

IN THE CLASSES OF AGRICULTURE, CHEMISTRY, MANUFACTURES, AND MECHANICS.

To Edward Rogers, Esq., Stanage Park, near Ludlow, for his plantations of forest-trees, the large gold medal.

— Mr. H. Powell, Clarendon-street, Somers-town, for his slow motion for the stage of a microscope, the silver Isis medal.

— Mr. H. Goadby, Goswell-street, for his microscope and instruments for dissecting insects, the large silver medal.

— Mr. W. Maugham, Adelaide-street Gallery, for his oxy-hydrogen blow pipe, the silver Isis medal.

— Mr. J. Roberts, Queen-street, Cheapside, for his jet for an oxy-hydrogen blow pipe, 5*l*.

— Mr. R. Knight, jun., Foster-lane, for his experiments on the texture of steel as affecting magnets formed of it, the silver Isis medal.

— Mr. A. Mackinnon, Sheffield, for his permutation lock, the silver Isis medal.

— Mr. J. Franklin, Bath-court, Old-street-road, for his machine for making tips for umbrellas, the silver Isis medal and 5*l*.

— Master W. J. Flight, King William-street, Strand, for a method of preventing heavy weights from falling when the rope breaks, the silver Isis medal.

— Mr. Theob. Boehm, Cannon-street, for his method of communicating rotatory motion, the large silver medal.

— Mr. Is. Dodds, Horsley Iron-Works, Birmingham, for his parallel motion for a steam-engine, the large silver medal.

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To Mr. W. Maclaurin, Canonbury-terrace, Islington, for his machine for stump engraving, the large silver medal.

— Mr. S. B. Howlett, Pall-mall, for his crayons fordrawing on glass, the large silver medal.

— Mr. G. H. Pearce, Brunswick-terrace, Blackwall, for his relieving stopper for a ship's steering wheel, the large silver medal.

— Ditto, for his signal lantern for ships, the large silver medal.

— Mr. W. Rooke, Union-street, Hope Town, Bethnal-green, for his addition to the Jacquard loom for weaving figured silks, 5*l.*

— Ditto, for his frame for brocading silks, the silver Isis medal and 5*l.*

IN THE CLASS OF POLITE ARTS.—AMATEURS,

FOR COPIES.

To Mr. James Vick, Grafton-street, Fitzroy-square, for a copy in oil of a portrait, the silver Isis medal.

— Mr. Frederick J. Evans, Gas-Works, Horseferry-road, Westminster, for a copy from a print of a steam-engine, the silver palette.

— Mr. M. A. Withall, Parliament-street, for a copy in pen and ink of a figure, the silver palette.

— Master Richard Andrews, Kensington-place, Westminster, for a copy in water-colours of flowers, the silver palette.

— Miss Lousia Aubert Pyne, Francis-street, Regent-square. for a copy in chalk of an historical subject, the silver Isis medal.

— Miss Notchells, Charlotte-street, Bedford-square, for a copy in Indian ink of an historical subject, the silver palette.

— Miss Helen Stanley, Rockingham House, Circus-road, St. John's Wood, for a copy in chalk of a figure, the silver palette.

— Miss Laura Cox, Grosvenor-place, for a copy in chalk of a head, the silver Isis medal.

— Miss Mary Anne Jones, Edgeware-road, for a copy in chalk of a head, the silver Isis medal.

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FOR ORIGINALS.

To Mr. Hen. Taylor, Great James-street, Buckingham-gate, for a drawing in chalk from a bust, the silver palette.

— Miss E. N. Van Worrell, Warren-street, Fitzroy-square, for a drawing of flowers from nature in water-colours, the silver Isis medal.

— Miss Anne Fell Rees, Sidmouth-street, Regent-square, for a drawing of flowers from nature in water-colours, the large silver medal,

— Miss E. Greenup Rickerby, Smith-street, Chelsea, for a botanical drawing of flowers in water-colours, the silver Isis medal.

— Miss Charlotte Green Cowell, Millbury-terrace, Dorset-square, for an original miniature, the silver Isis medal.

— Miss Harriet Judd, Ketton, near Stamford, for an original model of figures, the gold Isis medal.

ARTISTS.

FOR COPIES.

To Mr. J. Richardson, Colebrook-row, Islington, for a copy in oil of a group of portraits, the silver palette

— Mr. C. W. Wass, Great College-street, Camden-town, for a copy in chalk of an historical subject, the silver Isis medal.

— Mr. George Scharf, Francis-street, Tottenham-court-road, for a copy in chalk of a head, the silver palette.

— Mr. Alf. Ashley, Cross-street, Islington, for a copy in pencil of an animal, the silver palette.

— Miss Emma Maria Derby, Osnaburg-street, Portland-place for a portrait in water-colours copied from a print, the large silver medal.

— Mr. J. Tatam Stanesby, Vivian-terrace, Chelsea, for a wood engraving copied from a print, the silver Isis medal.

— Miss Eliza Owen Stanesby, Vivian-terrace, Chelsea, for an etching copied from a print, the silver Isis medal.

FOR ORIGINALS.

To Mr. A. J. Waudby, Charlton-street, Somers-town, for a

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drawing in chalk of a figure from the antique, the silver palette.

To Miss Augusta Eliza Cole, Taunton-place, Park-road, for an original miniature, the large silver medal.

— Mr. W. Gush, Jermyn-street, for an original portrait in oil, the gold Isis medal.

— Mr. Andrew Picken, King William-street, Strand, for a lithographic print of the ruins of the Parliament-house, the silver Isis medal.

— Mr. Frank Crissett, Kirby-street, Hatton-garden, for an original intaglio of a head, the silver Isis medal.

— Mr. Rob. W. Billings, Manor House, Blandford-place, Kentish Town, for an engraving of the hall at Lambeth palace, the silver Isis medal.

— Mr. E. H. Corbould, Crescent-place, Burton-crescent, for an original model of St. George and the Dragon, the gold Isis medal.

STUDENTS IN ARCHITECTURE.

To Mr. J. Page, Marsham-street, Westminster, for an original architectural drawing of Acanthus, the silver Isis medal.

— Mr. A. W. Mills, jun., Carey-street, Lincoln's-inn, for an original design in water-colours of the interior of a chapel, the silver Isis medal.

— Mr. J. Taylor, jun., Parliament-street, for an original water-colour drawing of the remains of the Parliament-house after the fire, the large silver medal.

— Mr. H. E. Kendall, jun., Suffolk-street, Pall-mall East, for an original design of a country mansion in the Elizabethan style, the gold medallion.

THE THANKS OF THE SOCIETY HAVE BEEN VOTED TO

Mr. J. Morris, for a tool for bookbinders.

J. Higgins, Esq., for his oblique spring candlestick.

Mr. W. Juggins, for his scale-plate of earthenware.

Mr. C. Varley, for a description of his graphic telescope.

S. C. Burrows, Esq., for his communication of the advantage of spade husbandry as a preparation for planting.

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W. Burge, Esq., for his samples of fibre from the Ripley pine of Jamaica.

P. Vaughan, Esq., for his samples of fibre from the Bromelia penguin of Jamaica.

Dr. Hamilton, for his samples of Pita fibre from Columbia.

C. J. Johnstone, Esq., for his communication respecting an insect which is destroying the sugar-cane in Grenada.

List of Patents

Granted by the French Government from the 1st of October to the 31st of December, 1834.

PATENTS FOR FIFTEEN YEARS.

To William Hosking, architect, of London, represented in Paris by Mr. Perpigna, advocate, of the French and Foreign Office for Patents, 4, Rue Choiseul, for an improved method of transmitting a moving power to waggons on railroads, or boats on canals.

— John Houldsworth, of Manchester, represented in Paris by Mr. Perpigna, advocate, for improvements in spinning machines.

— Isaac Walton, of Manchester, represented in Paris by Mr. Perpigna, advocate, for improvements in carding machines.

— William Nicholson, civil-engineer, of Manchester, represented in Paris by Mr. Perpigna, advocate, for an improved method of tracing and engraving drawings on cylindrical surfaces.

— John Houldsworth, of Manchester, represented in Paris by Mr. Perpigna, advocate, for improvements in machines used for carding cotton, and other fibrous substances.

— Felix Bouvier, attorney, of Orange, represented in Paris by Mr. Perpigna, advocate, for a smoke-consuming apparatus.

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To Careau, medical doctor, of Biere, represented in Paris by Mr. Perpigna, advocate, for an improved mechanical lamp.

— Midi de la Greneray, of Paris, for improvements in railroads.

— Claude Chenot, of Saponcourt, for improvements in the manufacturing of iron.

— Chauvet, of Paris, for improvements in boots and shoes.

— Dommarez, Monnereau, and Rambaud, for improvements in the weaving lathe.

— Clement Duplomb, silk-dresser, of Lyons, for improvements in the heating plates used for dressing all kinds of fabric.

— Vergue Peyronnenc, and Despruneaux, for the manufacturing and application of the oil extracted from the maritime pine tree.

— Philippe Garrigues, engineer, of London, for a new shearing machine.

— Andrieux and Gendron, of Bordeaux, for the manufacturing of surgical instruments with liquid caoutchouc.

— John Chubb, of London, for improvements in locks and padlocks.

— Antoine Gervais, of Paris, for a wheel with a semi-rotative action driven by a power with centrifugal impulse operating a perpetual motion.

— Auguste Louis de Meaupou, for an improved method of purifying, dessicating, and concentrating all kinds of substances, either solid or liquid.

— Witz Witz, of Cerny, for a new mill for grinding wheat, and any other kind of corn.

— Goulbier, engineer, of Paris, for an improved pump.

— Japy, brothers, of Beaumont, for a new lock.

— Pape, piano-maker, of Paris, for a piano without any string.

— Moisson, chemist, of Rouen, for a method of using a second time the madder employed for dyeing.

— Guillaume Higonnet, architect, of Paris, for an improved method of burning plaster of Paris.

— Houzeau Muiren, of Rheims, for an improved method of smelting iron.

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PATENTS FOR TEN YEARS.

To John Spear, of London, represented in Paris by Mr. Perpigna, advocate, for improvements in the tools used for making the fillet of screws.

— Thomas Drew, of Leeds, represented in Paris by Mr. Perpigna, advocate, for improvements in the machinery used for dressing or raising the nap on cloths or other tissues.

— Vincent Dubochet, of Paris, for a new kind of paper made with rushes.

— Caïman Duvergier, of Paris, for a new spinning wheel.

— Jacques Marie Désiré Leclerc, for a machine for printing cotton or other tissues.

— Henri Bernard Chaussenot, for an apparatus for preparing sparkling wines and waters saturated with carbonic acid gas.

— John Johnson Wickham, of Paris, for a mechanical apparatus for ascertaining the pressure required to reduce a rupture or hernia.

— Joseph Marleix, for the application of caoutchouc to the manufacturing of gentlemen's stocks.

— Manceaux and Laffanour, of Paris, for an improved cartridge box.

— Champallier and Pearson, of Calais, for a frame for manufacturing spotted bobbin-net.

— Onésiphore Pecqueur, civil-engineer, of Paris, for an apparatus for concentrating sirop in dacus.

— Victor Amédée Lavoipierre, for improved buckles for suspenders and belts.

— Jacques Francois, brothers, of Nantes, for an instrument called by them *fusil harpon*, applicable to whale fishery.

— Henri Louppe, of Rheims, for a forcing pump with pistons working on pivots.

— Louis Víctor Sire, of Eure, for a furnace for smelting iron ore.

— Edme Jacques Rousselet, of Paris, for a new printing press.

— Henri Pape, of Paris, for improvements in themachinery and the sounding board employed in pianos.

— Noel Arnott, of London, for improvements in metallic pens.

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To Lucien Angelique Devoir, of Paris, for a new motive power.

— Jean Marie Bompar, of Bordeaux, for a new boat supported by two spindles.

— Julien Dumont, of Paris, for a vacuum apparatus for concentrating sugar.

— Jean Antoine Faure, of Paris, for a method of making wax candles with butter.

— Tellier Blumenthal, of Bruxelles, for a vacuum apparatus for concentrating the juice of beet-root.

— Becquerelle Firmin, senior, for an improved grate for burning coal.

— Simon Gres Jean, of Mulhausen, for a method of utilising the gas which escapes from the leaden chambers where sulphuric acid is manufactured.

— Paulin Desormeaux, of Paris, for improvements in joiners planes.

— Armand Constant Hervé, of Strasbourg, for the application of steam in the working of iron.

— Tellier Blumenthal, of Bruxelles, for an apparatus for cooling beer.

— Henri Heathorn, of London, for a mechanical process to be used by joiners for bosing and sawing wood on tables or benches of a peculiar construction.

— Jean Jacques Courtois, for a new kind of brick to be used in the construction of chimneys.

— Hondeville, junior, of Saussay, for a motive power to be employed as a substitute for steam.

— Charles Gaubert, of Amiens, for a dragging machine with valves to every bucket.

— Joseph Auguste Delarotihiere, for improvements in the manufacturing of stockings.

— Joseph Bernard Racine, of Paris, for a new machine for making at once several metallic coils.

— Pierre Antoine Joseph Sirot, for an improved machine for making wire nails.

— Daubree, of Paris, for a new method of preparing paper and

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pasteboard, so as to render it water-proof and less combustible than they usually are.

To Pierre Ratisseau, for a new machine for grinding chocolate.

— Jean Alphonse Pourrat, of Paris, for a method of lessening the weight of carriages.

— Beatus Berniger, of Paris, for improvements in fire-arms.

— Vincent Labbé and Jacquart, merchants, of Rheims, for a motive power increasing threefold the strength of the machines to which it is adapted.

— Jean Stoddard, of Paris, for a machine for hulling rice.

— Etienne Henri Gontier, of Paris, for a new pulp to be used in making paper.

— Pierre Auguste Borguet Lancelivez, for a machine for grooving cylinders by means of a spur.

PATENTS FOR FIVE YEARS.

To George Lowe, of London, represented in Paris by Mr. Perpigna, for an explosive gas-engine.

— James Perry, of London, represented in Paris by Mr. Perpigna, for an improved concentrated ink.

— Alexandre Francois Sellique, of Paris, for instruments for boring the earth.

— Claude Allier, of Paris, for a watch going eight days without being wound, and appropriated to the use of the navy.

— Francoise Antoine Jecker, of Paris, for an improved barometer.

— Ignace Mertian, of Elh Bas Rhin, for a tubular apparatus for evaporating beet-root juice.

— Antoine Charlemagne Feragus, of Paris, for improved fastenings to doors and windows.

— Jean Bernard Filliot, of Paris, for a mechanical apparatus for raising patients off their beds.

— Charles Aimé Courtois, of Arras, for a method of reviving animal charcoal.

— Robbe, Losmann, and Martin, for a machine for making wire or pin nails.

— Louis Francois Lequesne, of Paris, for a moveable pump with two cylinders.

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To Richard Dubois, of Paris, for aromatic matches for restoring dead wine,

— De Braux d'Anglure, of Paris, for an improved kind of sealing wax.

— Jean Peliquié, of Nimes, for an apparatus called by him *griffe à lames mobiles*, and applicable to the Jacquart frame.

— Jean Marie Letestu, of Paris, for a mechanical lamp.

— Charles Besley, of Paris, for a new system of dikes.

— Auguste Vincard, of Paris, for a mechanical inking apparatus applicable to seals and stamps.

— Antoine Loddé, of Paris, for a new kind of feather broom.

— Georges Isidore Deslausiers, of Paris, for a pectoral syrup.

New Patents

SEALED IN ENGLAND,

June, 1835.

To Thomas Fleming Bergin, of Fair View Avenue, in the county of Dublin, civil engineer, for his invention of certain improvements in the method of suspending and adjusting the bodies of railway, and all other wheeled carriages.—Sealed 27th May—6 months for inrolment.

To John George Bodmer, of Bolton-le-Moors, in the county palatine of Lancaster, civil engineer, for his invention of certain improvements in machinery, for preparing, roving, and spinning cotton and wool.—Sealed 27th May—6 months for inrolment.

To John Losh, of 8, Crescent, in the city of Carlisle, gentleman, for his invention of an improvement in the

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surface or pattern roll of the machines, used in printing calico and other goods, commonly called surface printing-machine, and in the mode of working the said rolls. —Sealed 30th May—6 months for inrolment.

To Joseph Nye, of St. Andrew's-road, Southwark, in the county of Surrey, for his invention of improvements in pumps and instruments, or apparatus for conveying fluids into, and withdrawing them from, cavities of human and other animal bodies, part of which improvements are also applicable to other pumps.—Sealed 2d June—6 months for inrolment.

To John Malam, of Kingston-upon-Hull, in the county of York, civil engineer, for his invention of certain improvements in gas-meters, and in the apparatus for generating gas for illumination.—Sealed 2d June—6 months for inrolment.

To William Wilkinson, of Lucas-street, Commercial-road, in the parish of St. George-in-the-East, in the county of Middlesex, engineer, for his invention of a certain improvement or certain improvements in the mechanism or machinery by which steam power is applied, to give motion to ships or other floating vessels in or through water.—Sealed 2d June—6 months for inrolment.

To Richard Phillips, of New Kent-road, in the county of Surrey, lecturer on chemistry at St. Thomas's Hospital, for his invention of certain improvements in the process of manufacturing sulphate of soda.—Sealed 4th June—6 months for inrolment.

To James Leman, of Lincoln's-inn-fields, in the county of Middlesex, gentleman, for the making, mixing, compounding, improving, or altering of soap, being a communication from a foreigner residing abroad.—Sealed 4th June—6 months for inrolment.

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To Bennet Woodcroft, of Ardwick, in the parish of Manchester, in the county of Lancaster, gentleman, for his invention of improvements in printing calicoes, and other fabrics, whether manufactured of cotton, silk, wool, or linen, or of all, or any two or three of those materials.—Sealed 4th June—6 months for inrolment.

To Thomas Hancock, of Goswell-mews, Goswell-street-road, in the county of Middlesex, water-proof cloth-manufacturer, for his invention of an improvement or improvements in air-beds, cushions, and other articles manufactured from caoutchouc or Indian rubber, or of cloth, or other flexible material, coated or lined with caoutchouc or Indian rubber.—Sealed 4th June—6 months for inrolment.

To Joseph Whitworth, of Manchester, in the county palatine of Lancaster, machinist, for his invention of certain improvements in machinery, tools, or apparatus for turning, boring, planning, and cutting metals and other materials.—Sealed 11th June—6 months for inrolment.

To Elias Carter, of the city of Exeter, gentleman, for his invention of an improved apparatus for regulating the supply of gas to the burners, and for the stopping off the same, applicable also as a cock in drawing off or regulating the flow of other fluids.—Sealed 22d June—6 months for inrolment.

To John William Fraser, of Ludgate-hill, in the city of London, artist, for his invention of improvements in apparatus for descending under water.—Sealed 22d June—6 months for inrolment.

To James Michell, of Truro, in the county of Cornwall, gentleman, for his invention of an improved process in smelting argentiferous ores.—Sealed 22d June—6 months for inrolment.

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CELESTIAL PHENOMENA, FOR JULY, 1835.

D.	H.	M.	
1			Clock before the ☉ 3m. 19s.
—			☽ rises 9 h. 20 m. M.
—			☽ passes the mer. 4 h. 35m. A.
—			☽ sets 11 h. 33 m. A.
	3	6	☉ in Apogee.
2	17	9	☿ stationary.
3	2	41	☽ in □ or first quarter.
	4	53	☿ in Aphelion.
5			Clock before the ☉ 4m. 4 s.
—			☽ rises 2 h. 46 m. M.
—			☽ passes the mer. 7h. 50m. A.
—			☽ sets 0 h. 23 m. M.
6			Occul. λ in Libra, im. 9h. 29m., em. 10h. 23m.
7	9		☽ in Perigee.
9	6	12	♄ □ ☉.
10			Clock before the ☉ 4m. 58 s.
—			☽ rises 9 h. 8 m. M.
—			☽ passes the mer. morn.
—			☽ sets 3h. 53m. M.
	6	37	Ecliptic oppo. or ○ full moon.
12	17	21	♅ in conj. with the ☽ diff. of dec. 4. 37. N.
15			Clock before the ☉ 5 m. 30 s.
—			☽ rises 11h. 5m. M.
—			☽ passes the mer. 4h. 16m. M.
—			☽ sets 9 h. 54 m. M.
—			Mer. R. A. 7 h. 45 m. dec. 16. 21. N.
—			Ven. R. A. 6 h. 2 m. dec. 23. 1. N.
—			Mars R. A. 10 h. 49 m. dec. 8. 31. N.
—			Vesta R. A. 7 h. 36 m. dec. 22. 24. N.
—			Juno R. A. 8 h. 51 m. dec. 12. 34. N.
—			Pallas R. A. 16 h. 40 m. dec. 28. 54. N.
—			Ceres R. A. 16 h. 46 m. dec. 23. 51. S.
15			Jup. R. A. 6 h. 8 m. dec. 23. 13. N.
—			Sat. R. A. 13 h. 6 m. dec. 4. 22. S.
—			Georg. R. A. 22 h. 9 m. dec. 12. 14. S.
—			☿ passes the mer. 0 h. 15 m.
—			♀ passes the mer. 22 h. 32 m.
—			♂ passes the mer. 3 h. 18 m.
—			♃ passes the mer. 22 h. 29 m.
	4	4	♀ in conj. with ♃ diff. of dec. 0. 12. S.
16	22	42	☿ in inf. conj. with the ☉.
17	3	44	☽ in □ or last quarter.
19	6		☽ in Apogee.
20			Clock before the ☉ 5m. 56s.
—			☽ rises 0 h. 4 m. M.
—			☽ passes the mer. 7h. 46m. M.
—			☽ sets 3h. 48m. A.
22	15	7	♃'s second sat. will im.
	20	37	♃ in conj. with the ☽ diff. of dec. 2. 24. S.
23	12	44	♀ in conj. with the ☽ diff. of dec. 2. 54. S.
	15	38	☿ greatest Hel. lat. S.
24	4	49	☿ in conj. with the ☽ diff. of dec. 7. 56. S.
25			Clock before the ☉ 6m. 9s.
—			☽ rises 3h. 21m. M.
—			☽ passes the mer. 11 h. 59 m. M.
—			☽ sets 8 h. 26 m. A.
	1	23	♀ ascending node.
	5	14	Ecliptic conj. or ● new moon.
27	7	54	☿ stationary.
28	14	19	♂ in conj. with the ☽ diff. of dec. 4. 36. S.
30	17	12	☿ in conj. with ♀ diff. of dec. 3. 20. S.
	18	57	♄ in conj. with the ☽ diff. of dec. 1. 33. S.

J. LEWTHWAITE, Rotherhithe.

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METEOROLOGICAL JOURNAL

FOR MAY AND JUNE, 1835.

1835.	Thermo.		Barometer.		Rain in inches.	1835.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low.	High.	Low.			Hig.	Low.	High.	Low.	
May						June					
26	59	44	29,56	29,46		10	83	50	30,22	30,20	,075
27	61	40	29.57	29,40	,025	11	84	55	30,28	30,26	
28	64	38	29,90	29,84		12	83	53	30,29	Staty.	
29	60	37	29,93	29,96		13	82	51	30,29	Staty.	
30	65	37	29,89	29,77		14	80	53	30,27	30,23	
31	57	41	29,65	29,61		15	76	50	30,14	30,05	
June						16	75	54	30,17	30,09	
1	61	47	29,59	29,54	,225	17	76	61	30,09	30,05	
2	67	49	29,71	29,65	,15	18	73	58	30,00	Staty.	
3	70	51	29,80	29,78	,05	19	77	60	29,95	29,90	
4	67	51	29,96	29,89	,025	20	75	58	29,85	29,81	
5	62	45	29,96	Staty.		21	71	51	29,88	29,83	
6	80	51	30,00	29,98		22	73	49	29,78	29,67	
7	80	59	30,06	30,04		23	69	54	29,58	29,50	,3
8	82	53	30,08	30,04		24	58	51	29,40	29,18	,075
9	83	57	30,15	30,09		25	54	45	29,53	29,29	,35

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37' 32 N.
Longitude 3 51 West of Greenwich.

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THE

London

JOURNAL OF ARTS AND SCIENCES

AND

REPERTORY

OF

PATENT INVENTIONS.

CONJOINED SERIES.

No. XLI.

Recent Patents.

To George Bather, *of the Haymarket, in the parish of St. James, Westminster, scale-maker, for his invention of a weighing machine upon a new construction.*— [Sealed 22d May, 1834.]

This invention of a weighing machine upon a new construction, consists in the adaptation of certain levers and other appendages to a sack barrow, or warehouse truck, a sort of hand-carriage commonly employed in warehouses for removing sacks of corn, coal, potatoes, casks of butter, cheeses, and various other goods, by which adaptation of levers, &c., the goods so removed may be weighed in the said truck or barrow; and which appendages, when adapted to such trucks or barrows, will not prevent their being em-

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ployed for the purposes of removing goods in the same way as the ordinary construction of sack barrows and warehouse trucks usually are: the weighing apparatus being readily brought into operation when required, or removed from the truck or barrow when not wanted.

Plate XIV.,* fig. 1, exhibits a front elevation of a truck or barrow of the kind generally used for moving sacks of coals, corn, potatoes, and other articles in a warehouse, from one situation to another, to which is attached the levers and other parts of the improved weighing machine in the compact form which they would assume when not in use. Fig. 2, is a side elevation of the same. Fig. 3, is another side elevation, showing the parts of the weighing machine extended and in operation; that is, in the act of weighing a sack. Fig. 4, is a front view of the same; that is, the weighing parts being placed ready for operation, as fig. 3. Fig. 5, is a horizontal view; and fig. 6, is a vertical section of the same, the parts for weighing being extended as in the two preceding figures.

Similar letters of reference being used to denote corresponding parts in all the figures: *a, a,* are the sides and handles of the truck or barrow; *b, b,* the sack iron shoe, which is pushed under the sack of other goods about to be moved, for the purpose of supporting them; *c, c,* are the wheels of the truck; *d, d,* are two hooks, which may be fixed to the sides or the truck, or attached to the cross stretcher *e.* Upon these hooks the pivots, with V edges *f, f,* extending from the middle of each of the scale beams *g, g,* bear.

The scale upon which the sack, or other article intended to be weighed, must be placed, is shown at *h,* formed so as to lay within the sack iron or shoe *b,* and not to project above its upper surface, as seen in figs

1, and 2. This scale is connected by hinge joints to the perpendicular rods or frame *i*, *i*; which rods are suspended by rings or eyes at top, bearing upon pivots with V edges, *k*, *k*, at the front ends of the scale beam *g*. At the back of the truck is the balance or weight scale, connected by hinge joints to the perpendicular rods or frame *m*, *m*, suspended from the scale beam behind by rings bearing on the V edges of pivots at *n*, *n*.

When the weighing machine attached to the truck is not required to be put into operation, the balance scale may be turned up out of the way, as shown at figs. 1, and 2, and secured in that position by a staple or catch *j*, (see fig. 6,) which is also shown by dots in fig. 9, the staple passing through a hole *s*, in the scale *l*. After the sack, or other goods to be weighed, is placed on the front sack iron or shoe *b*, the scale *l*, is to be turned down, and the necessary weights placed upon it, as shown at fig. 3. By the descent of the balance scale *l*, with its weights, the weighing scale *h*, with its load, will be made to rise, the two scales *h*, and *l*, vibrating upon the V edge pivots *f*, *f*, of the beams *g*, *g*, in the hooks *d*.

At the lower part of the truck there is a connecting link or stretcher *o*, seen best in figs. 1, and 6, and shown detached at fig. 7: this is intended to keep the rods or frames *i*, and *m*, and scales *h*, and *l*, in their proper situations when in operation. The hooked ends of the connecting piece or stretcher act in holes in the transverse bars *p*, *p*, (see fig. 5,) the holes having V edges to prevent friction, so that they may not impede the vibrations of the weighing machine.

Fig. 8, is a representation of the central cross bar or brace at bottom of the truck, detached, showing the adjusting screws *q*, *q*, on its ends, which fit into recesses

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on the sides of the truck, as seen in fig. 6. By means of these screws the bars or brace *y*, can be adjusted to the proper height, and be afterwards secured to the truck by screw-nuts *x*, *x*, on the outsides. Fig. 9, is a view of the weighing parts, detached from the truck, in the position they would assume when in use. Fig. 10, is a similar representation when folded together and the scales turned up, so as to occupy as little room as possible. These weighing parts may be readily removed from the truck, by merely lifting them out of the hooks *d*, *d*, when in the position shown in fig. 10. The truck can then be used as an ordinary sack barrow, and, if necessary, two rods or pins, one of which is shown detached at fig. 11, may be passed through the holes at *w*, *w*, in the sides of the truck, in order to keep the sacks or goods from falling through the barrow.

Should it be thought desirable, a steel yard may be employed in connexion with this weighing machine, either in conjunction with or instead of the balance scale *l*, and its weights.

Fig. 12, is a detached representation of a steel yard adapted to be used with the other parts of this weighing machine. Fig. 13, is a partial sectional figure, showing it applied to the machine: *r*, is a graduated steel yard, with its weight; *s*, and *t*, are two notches formed on its end, into which the two V-edged bars *u*, and *v*, on the scale beam *g*, work or act as fulcrums. By this mode of connexion, the steel yard, when in operation, becomes part of the weighing machine.

The Patentee says, in conclusion, having now described my invention of a weighing machine upon a new construction, I wish it to be understood that I do not mean or intend to confine myself to the precise form or dimensions of the several parts separately, as

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it is evident they may be slightly varied to suit different descriptions of sacks, trucks, or barrows of different sizes, according to the weight or bulk of goods required to be weighed; nor do I intend to confine myself to the exact method described of suspending the weighing parts by the rings and V edges, as they may be varied: for instance, the rings or bearings may be formed on the scale beam, and the V edges on the frames or vertical scale rods i, and m, instead of the arrangement shown in the drawings. And, lastly, I claim as my invention, the adaptation, to sack barrows, trucks, or carriages for removing goods, of a machine or apparatus for weighing, the truck or carriage constituting a frame or standard for weighing purposes.—[*Inrolled in the Rolls Chapel Office, November*, 1834.]

Specification drawn by Messrs. Newton and Berry.

To Henry Robert Salmon Devenoge, *of Little Stanhope-street, May Fair, in the county of Middlesex, gentleman, in consequence of a communication made to him by a foreigner residing abroad, for certain improvements of machinery for making bricks.*—[Sealed 8th May, 1830.]

The subject of this patent is a machine of rather a complicated construction, the most prominent feature of which is a pair of rotary cylinders or drums, having cells or boxes in their peripheries to receive the clay, and for moulding it into bricks.

The two cylinders or drums revolve together, their surfaces being in contact, and the clay which feeds

them descends through a hopper into the space between the drums by its own gravity.

The cylinders or drums are made to revolve by toothed gear; and in revolving, press the clay into the boxes or moulds, the outer surfaces of which are scraped smooth by an instrument placed for that purpose; and when, by the rotations of the cylinders, the moulds are brought round to the lowest position, the bricks are successively let fall on to a travelling endless cloth, which conducts them away.

The only feature of novelty that we discover (none being pointed out by the Patentee), is the mechanism by which the bottoms of the moulds are made to slide outwards, for the purpose of discharging the bricks as they are formed.

The bottom of each box or cell is a plunger or sliding piece, and these plungers have angular tappets extending out on their sides, the inclined planes of which, as the drums revolve, are brought against fixed wipers, which shift the plungers inward previous to the moulds receiving the clay, and outward when the brick has been moulded for the purpose of discharging it.

The Patentee says, that in the employment of this improved machine, no sand will be required for the moulds. It is our opinion, however, that the same difficulty caused by the adhesion of the clay to the plungers will occur in this as in other machines, none of which have yet been found to answer the purpose, principally from the difficulty of discharging the brick from the mould.—[*Inrolled in the Inrolment Office, July, 1830.*]

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To JOHN LEE BENHAM, *of Wigmore-street, in the county of Middlesex, ironmonger, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements in shower and other baths.*—[Sealed 13th December, 1830.]

THE improvements described under this patent are principally designed as additions to the ordinary shower bath, and consist in causing jets of water to be thrown laterally, as well as downwards, upon the body of the person taking the bath, such jets issuing through small holes pierced in pipes, placed round the inside of the bath, the jets acting in various directions upon the body, and thereby forming a novel sort of shower bath.

The lateral jet pipes are bent into the form of hoops, and placed in two or more situations in the bath, so as to throw the jets of water upon different parts of the body. They receive their supply of water by vertical pipes, having proper stop cocks, with the cistern above, which cistern also supplies the rose head or cullender of the ordinary shower bath; and, if it is desired, there may be also jet pipes placed below, for the purpose of throwing upwards a jet of water upon the body, in order that all parts of the person may be subjected to the shower.

The Patentee states that there are various ways of effecting the object of his invention, by arrangements of lateral pipes extending round the inside of the bath; but in order to produce the jets all round, those parts of the lateral pipes which pass across the door of the bath are to be fitted with an elastic packing at the

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flanges, in order that these pipes may be removed on opening the door, for the purpose of gaining access; but that on the door closing, the disjointed portions of the pipes, which crossed the doorway, may become connected again with a water-tight joint.'

"There are proper valves and cocks under the command of the person within the bath, the water being admitted into the rose head and lateral pipes by drawing a handle, which opens the supply cocks, at which time the water rushes into the rose head, and at the same time down the vertical pipes into the circular lateral pipes; and thus produces a shower of water in various directions, which acts upon all parts of the body as described, with much more effect than when only allowed to fall down upon the person, as in the ordinary shower baths.—[*Inrolled in the Inrolment Office, June,* 1831.]

To John Browne, *of Bridgewater, in the county of Somerset, merchant, for his invention of an improved instrument or apparatus for ascertaining levels.*—[Sealed 23d December, 1834.]

This improved instrument or apparatus is designed for levelling or ascertaining the difference of altitude of certain points of land, extending over an undulating surface of country, or for mining or excavating, banking, draining, and other purposes.

The instrument consists of a flexible water-tight tube, of any convenient length, having tubular glass vessels at its extremities. This flexible tube, with its

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glass vessels, is to be nearly filled with water, or other fluid; and as the fluid at the two ends of the tube (however much the tube may be contorted or extended) will naturally find its common level, the surfaces of the fluid, when seen in the two glass vessels at the opposite ends of the tube, will indicate the true horizontal line or corresponding altitude at the two stations.

In order to determine the exact measure of the altitude or depression of the surface of the earth, or of any point of elevation at one station compared to another station the glass vessels at the extremities of the flexible tube are attached to graduated station rods or staffs, intended to be placed perpendicularly at the stations; upon which rods or staffs the ends of the tubes, with the glass vessels, may be slidden up or down, for the purposes of adjustment. The ends of the tubes are furnished with stop cocks, to prevent the escape of water, and also to admit air when the instrument is in operation.

The graduated station rods or staffs, with the ends of the flexible tube attached thereto, being placed perpendicularly at the stations or points of observation, the glass vessel at the lower station must be slidden up its rod, and that of the higher station slidden down its rod, until the surfaces of the fluid in the tube are seen in both glass vessels, indicing or bisecting the graduations on the rods or staffs. The surfaces of the fluid in the glass vessels will thus exhibit the true horizontal line or level; and their heights from the ground at the respective stations indicated by the graduations on the station rods or staffs, will then show by comparison the difference of altitude between the two points of observation.

The several figures in the drawings (see Plate XIV.)

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will explain the construction and modes of adapting this instrument to the purposes of ascertaining levels. Fig. 14, is a side elevation of the instrument, as placed when in use, the staffs or rods being held upright by the engineer, or persons using the level. Fig. 15, is a side elevation of one of the glass vessels at the end of the tube, showing the method of connecting them with the staffs or measuring rods, which is drawn on a larger scale. Fig. 16, is a vertical section of the same. Fig. 17, is a top view of one of the ends; and fig. 18, is a transverse section taken through the stop cock.

Let A, and B, in fig. 14, represent the two stations or places on the surface of the ground, the difference of altitude of which it is desired to ascertain. The graduated staffs or measuring rods being thus placed at the stations, the stop cock of the glass vessel at the higher ground is first to be opened for the admission of air; the person at the lower station then slides the glass vessel at the end of the tube up the staff, at the same time opening its cock for the admission of air, when the circulation of the fluid being free to the pressure of the atmosphere, it finds its level, which is seen in the two glass vessels, and indicated by the dotted line C, D.

The two graduated staffs or measuring rods *a*, and *b*, stationed at A, and B, have attached to them, by sliding pieces, the two glass tubular vessels *c*, and *d*, which are affixed to the ends of the flexible tube *i*, *i*. These glass vessels are protected by metal casings *e*, *f*, and furnished with stop cocks *g*, *h*, for the admission of air.

The flexible tube is to be made of hempen or woollen cloth, saturated with a solution of Indian rubber or caoutchouc, in the manner Indian rubber tubes are

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usually made; but it may be constructed of leather, or other flexible material, or of metal, as will be hereinafter described.

The glass vessels at the ends of the tube are connected to the rods or staffs by the following means. The staffs *a*, and *b*, are passed through the triangular pieces *k*, *k*, extending from the cases *e*, and *f*. The lower of these pieces *k*, *k*, are furnished with tightening screws at *l*, *l*, for the purpose of fixing the ends of the tubes to the staffs, when the fluid has found its level, and the two surfaces are perceived in the glasses.

In fig. 14, the dotted line C, to D, shows the level of the fluid in the ends of the tube; the surface of that in the glass *c*, at the station A, would indicate or be opposite to the graduation of thirteen inches and three-tenths of an inch upon the rod or measuring staff *a*; and that in the glass *d*, would bisect or indicate at the graduation of six inches on the staff *b*. The difference between these being seven inches and three-tenths, shows the difference of altitude or level between the two stations. Fig. 19, is a partial section of one end of the instrument, showing another mode of connecting the glass vessels with the ends of the flexible tube.

Fig. 20, is a plan view of an instrument, having three different staffs or rods, and glass vessels, connected to three flexible tubes, by which means the comparative altitudes of three different stations can be seen at one time; and if desired, a fourth tube, with its staff and vessel, might be added. Figs. 21, and 22, are representations of one method of constructing this instrument, with different lengths of metal tubes, connected together by hollow joints, to allow of the free passage of the fluid. Fig. 21, is a side elevation; and fig. 22,

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is a plan or horizontal view of the same; and as the same letters of reference are marked upon the parts corresponding to those in the former figures, the foregoing description will serve to explain these figures; *i*, *i*, *i*, are the lengths of metal tubes, which are connected together, and to the glass vessels at the ends of the tube by the hollow joints at *m*, *m*.

Fig. 23, represents another modification of the improved levelling apparatus, in which two fluids of different specific gravities are used to ascertain the difference of altitude between the stations, the heavier fluid sustaining the lighter, and indicating the rise of the surface of the lighter fluid contained in the glass vessel at the upper end of the instrument by a comparative rise of the surface of the heavier fluid contained in the lower glass vessel: the scale or measuring rod against which the upper surface of the heavier fluid indices or bisects, having an accurately graduated comparative scale to suit the difference in the specific gravities of the two fluids.

For example, mercury may be used as the heavier fluid, and water as the lighter; when, on the one end of the tube containing the water being raised to the higher station, the column of the water pressing upon the mercury will cause the surface of the mercury in the other end of the tube at the lower station to rise in relation to the differences of their specific gravities. Let A, and B, represent the two stations, the different altitudes of which it is desired to ascertain. The long flexible tube *a*, *a*, *a*, *a*, being filled with the lighter fluid (say water), is connected to the glass vessel *b*, in which the level or surface of the water is seen, and the other end connected to the larger glass vessel or reservoir of mercury *c*. The lower end of the vessel *c*, communi-

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cates with the open glass tube *d*, in which the surface of the mercury is seen rising and falling against the graduated scale *e*, as the altitude of the column of the water is increased or diminished.

The graduated scale *e*, against which the surface of the mercury in the tube *d*, indices, must, as before stated, be accurately graduated to correspond with the difference of specific gravity between the two dissimilar fluids; for as the end of the instrument at B, is elevated, the mercury will indicate, by its proportionate rise in the tube *d*, the increased elevation of the column of water in the ratio of their comparative specific gravities.

The tube *d*, and reservoir *c*, are connected to the staff *f*, so as to slide up and down it; and the scale *e*, should also be made to slide on the staff *f*. The water tube *b*, is in like manner connected to the staff *g*, and made capable of sliding.

There are proper stop cocks *h*, *h*, which are closed to prevent the escape of the water and mercury when the instrument is not in use; and the upper end of the tube *d*, must also be plugged or stopped with a cock; but all of these cocks must be open when the level is in action, for the purpose of allowing the pressure of the atmosphere to act upon the fluids.

When the instrument is about to be put into operation, the staff *f*, with its mercury tube, must first be placed on the lower station A; then all the cocks must be opened, and the water vessel *b*, be brought near to the mercury tube *d*, and raised or lowered upon its staff *g*, until the surface of the water in the vessel *b*, and of the mercury in the reservoir *c*, and tube *d*, are in a line of coincidence; then the scale *e*, must be slidden until the zero or *o*, on the scale stands opposite those surfaces.

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When the scale is thus adjusted, the staff *g*, with the water vessel, may be carried to the upper station B, and as the column of water is raised, so will the surface of the mercury in the tube *d*, be raised also (but only in proportion to the difference of their specific gravities), indicating on the proportionate scale *e*, the number of feet and inches to which the column of water has been elevated at the higher station, and, consequently, the difference of altitude between the two stations, as shown in the figure, when the surface of the mercury should indicate a rise of four inches and a half, which is equal to four feet altitude of the surface of the water in the tube *b*.

This operation may be reversed, the end of the instrument with the mercury being placed upon the higher station, and the water tube at the lower station, when the mercury will necessarily fall in the tube *d*, and its depression indicate the difference of altitudes between the stations.

If it should be thought desirable, there may be placed in the tube *d*, a small float, bearing upon the surface of the mercury, counterbalanced by a weight and cord passed over a small pulley like the float of an ordinary barometer having a circular dial, such cord turning the axis of a pulley which carries an index or hand to mark the rise and fall of the surface of the water on a circular graduated dial.

The Patentee says, I would here remark, that it will be evident to all practical men that the specific gravity of the water and mercury, or other fluids, will vary under different temperatures; consequently, the scales being graduated to certain specific gravities, the altitude of the different stations or places to be measured, as given by the scales, will not at all times be precisely

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correct; but this little inaccuracy may be rectified by tables of the proportionate specific gravities of the two fluids under different temperatures, the temperature of the atmosphere being ascertained by a thermometer at the time the instrument is used.

Having explained the nature and construction of the invention of instruments or apparatus for ascertaining levels, the Patentee remarks, that they are applicable to the purposes of ascertaining the comparative altitudes of different places or stations, and for various other purposes, but particularly for ascertaining levels in excavating land, either for mining, for canals, or in the construction of railroads, embankments, mill-dams, and in the drainage of land, and also in ascertaining levels for buildings, and for other purposes; and that he desires it to be understood, and hereby declares that he does not intend to confine himself to the precise forms or methods of constructing the instruments shown in the drawings, as they are intended to be varied to suit different purposes; but he claims particularly the sole use, application, and employment of flexible or jointed tubes, for the purpose of containing fluids of the same specific gravity, or of different specific gravities, as herein set forth and described, for the purposes of levelling or ascertaining the difference of altitudes of different stations or places.—[*Inrolled in the Rolls Chapel Office, June,* 1835.]

Specification drawn by Messrs. Newton and Berry.

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To John Twisden, *of Halberton, near Tiverton, in the county of Devon, commander in the Royal Navy, for his invention of improvements applicable to inland navigation.*—[Sealed 24th July, 1834.]

These improvements are described as consisting in certain additions to, and improvements on, Dr. Anderson's perpendicular lift for raising and lowering boats and vessels in canals, from one level to another, for the purpose of saving water, and in situations where it is inconvenient or impracticable to have an under-drain to keep the lower chamber free from water, for the reception of the lower coffer.

The improvements of Dr. Anderson here alluded to were not originally made the subject of a patent, but were suggestions offered by the inventor about forty years ago, in connexion with his general view of the agriculture of the county of Aberdeen. As the same ideas have been modified and incorporated into many patents subsequently granted, we think it desirable to explain the original invention in the words of the author, as given in the "Repertory of Arts," vol. ii., First Series, and accompanying it with the original plate:—

"It is in many cases a matter of so much difficulty to provide water, in sufficient quantities, for the consumption of a canal where many boats are to pass, and the interruption is so great, in passing numerous locks, where the rise is considerable, that it has often been wished that an eligible method of lowering and elevating boats could be devised, without the assistance of water-locks; and though it is evidently at first view practicable, and several different modes of doing it have been suggested, some of which have actually been carried into effect, yet all of them have been found to be attended with such inconvenience as to render an improvement in this respect still necessary.

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"In China, where water-carriage is more generally practised than in any kingdom of Europe, boats are raised and lowered from one canal into another, by sliding them along an inclined plane; but the contrivances for effecting that purpose are so awkward, and such a number of hands are required, that it has in general been deemed inexpedient to resort to that mode of practice in Europe. Several devices, that discovered considerable ingenuity, however, have been published, with a view to facilitate this operation; either by rendering the motion up the inclined plane more equable, or producing a power sufficient to move these great weights, but none of them have yet been so simple in their construction as could be wished, nor have they afforded satisfaction in practice. The following device is therefore now offered to the public, as possessing at least the merit of simplicity in as high a degree as could perhaps be wished; and, in the opinion of very good judges of matters of this sort, to whom the plan has been shown, it has been deemed fully adequate to the purpose of raising and lowering boats of a moderate size; that is, of twenty tons, or downwards; and it is the opinion of most men with whom I have conversed, who are best acquainted with inland navigations, that a boat of from ten to fifteen tons is better than those of a larger size.

"You are to suppose that fig. 1, Plate XV., represents a bird's-eye view of this simple apparatus, as seen from above: A, is supposed to be the upper reach of the canal; and B, the lower reach, with the apparatus between the two. This consists of three divisions; the middle one, extending from C, to D, is a solid piece of masonry, raised from a firm foundation below the level of the bottom of the second reach: this is again divided into five parts, viz. *d*, *d*, *d*, where the wall rises only to the height of the water in the upper reach; and *e*, *e*, two pillars, raised high enough to support the pivots of a wheel or pulley *g*, placed in the position there marked.

"The second division *h*, consists of a wooden coffer of the same depth nearly as the water in the upper reach, and of a size exactly fitted to contain one of the boats. This communicates

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directly with the upper reach, and, being upon the same plane with it, and so connected with it as to be water-tight, it is evident, from inspection, that nothing can be more easy than to float a boat into this coffer from the upper reach. The part of the wheel that projects over it being at a sufficient height above it, so as to occasion no sort of interruption.

"Third division. At *i*, is represented another coffer, precisely of the same dimensions with the first; but here two sluices which were open in the former, and only represented by dotted lines, are supposed to be shut, so as to cut off all communication between the water in the canal and that in the coffer. As it was impossible to represent this part of the apparatus on so small a scale, for the sake of illustration it is represented more at large in fig. 4, where A, as before, represents the upper reach of the canal, and *b*, one of the coffers. The sluice *k*, goes into two cheeks of wood, joined to the masonry of the dam of the canal, so as to fit perfectly close; and the sluice *f*, fits, equally close, into cheeks made in the side of the coffer for that purpose; between these two sluices is a small space *o*. The coffer, and this division *o*, are to be supposed full of water; and it will be easy to see that these sluices may be let down, or drawn up, at pleasure, with much facility.

"Fig. 5, represents a perpendicular section of these parts in the same direction as in fig. 4, and in which the same letters represent the same parts.

"Things being thus arranged, you are to suppose the coffer *h*, to be suspended, by means of a chain passed over the pulley, and balanced by a weight, that is sufficient to counterpoise it, suspended at the opposite end of the chain. Suppose, then, that the counterpoise be made somewhat lighter than the coffer with its contents, and that the line *m*, *n*, (fig. 5,) represents a division between the solid sides of the dam of separation, which terminates the upper reach, and the wooden coffer, which had been closed only by the pressure of its own weight (being pushed a very little from A, towards B, beyond its precise perpendicular swing), and that the joining all round is covered

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with lists of cloth put upon it for that purpose; it is evident that, so long as the coffer is suspended at this height, the joining must be water-tight, but no sooner is it lowered down a little than this joining opens, the water in the small division, *o*, is allowed to run out, and an entire separation is made between the fixed dam and this moveable coffer, which may be lowered down at pleasure, without losing any part of the water it contained.

"Suppose the coffer now perfectly detached, turn to fig. 2, which represents a perpendicular section of this apparatus, in the direction of the dotted line *p*, *p*, (fig. 1.) In fig. 2, *h*, represents an end view of the coffer, indicated by the same letter as in fig. 1, suspended by its chain, and now perfectly detached from all other objects, and balanced by a counterpoise *i*, which is another coffer exactly of the same size, as low down as the level of the lower reach. From inspection only it is evident that, in proportion as the one of these weights rises, the other must descend. For the present, then, suppose that the coffer *h*, is by some means rendered more weighty than *i*, it is plain it will descend, while the other rises: and they will thus continue till *h*, comes down to the level of the lower reach, and *i*, rises to the level of the higher one.

"Fig. 3, represents a section in the direction A, B, (fig. 1,) in which the coffer *i*, (seen in both situations) is supposed to have been gradually raised from the level of the lower reach B, to that of the higher A, where it now remains stationary; while the coffer *h*, (which is concealed by the masonry) has descended in the mean time to the level of the lower reach, where it closes by means of the juncture *r*, *s*, fig. 5, (which juncture is covered with lists of cloth, as before explained, at *m*, *n*, and is of course become water-tight,) when, by lifting the sluice *t*, and the corresponding sluice at the end of the canal, a perfect communication by water is established between them. If, then, instead of water only, this coffer had contained a boat, floated into it from the upper reach, and then lowered down, it is very plain that when these sluices were removed, after it had reached the level of the lower reach, that boat might have been floated out of the coffer

with as much facility as it was let into it above. Here, then, we have a boat taken from the higher into the lower canal; and, by reversing this movement, it is very obvious that it might be, with equal ease, raised from the lower into the higher one. It now only remains that I should explain by what means the equilibrium between these counter-balancing weights can be destroyed at pleasure, and the motion of course produced.

It is very evident, that if the two corresponding coffers be precisely of the same dimensions, their weight will be exactly the same when they are both filled to the same depth with water. It is equally plain, that should a boat be floated into either or both of them, whatever its dimensions or weight may be, so that it can be contained *afloat* in the coffer, the weight of the coffer and its contents will continue precisely the same as when it was filled with water only: hence, then, supposing one boat is to be lowered, or one to be raised at a time, or supposing one to be raised and another lowered at the same time, they remain perfectly in equilibrium in either place, till it is your pleasure to destroy that equilibrium. Suppose, then, for the present, that both coffers are loaded with a boat in each; the double sluices both above and below closed; and suppose, also, that a stop-cock *u*, in the under edge of the side of the lower coffer (figs. 3 and 5), is opened, some of the water which served to float the boat in the coffer will flow out of it, and consequently that coffer will become lighter than the higher one; the upper coffer will of course descend, while the other mounts upwards. When a gentle motion has been thus communicated, it may be prevented from accelerating, merely by turning the stopcock, so as to prevent the loss of more water, and thus one coffer will continue to ascend, and the other to descend, till they have assumed their stations respectively, when, in consequence of a stop below and another above, they are rendered stationary at the level of the respective canals.*

* It does not seem necessary to adopt any other contrivance than the above for regulating the motions; but, if it should be found necessary, it would be easy to put a fly-wheel on the same axle.

"Precisely the same effect will be produced when the coffers are filled entirely with water.

"It is unnecessary to add more to this explanation, except to observe, that the space for the coffer to descend into must be deeper than the bottom of the lower canal, in order to allow a free descent for the coffer to the requisite depth; and of course it will be necessary to have a small conduit to allow the water to get out of it. Two or three inches free, below the bottom of the canal, is all that would be necessary.

"Where the height is inconsiderable, there will be no occasion for providing any counterpoise for the chain, as that will give only a small addition to the weight of the undermost coffer, so as to make it preponderate, in circumstances where the two coffers would otherwise be in perfect equilibrium; but, where the height is considerable, there will be a necessity for providing such a counterpoise; as, without it, the chain, by becoming more weighty every foot it descended, would tend to destroy the equilibrium too much, and accelerate the motion to an inconvenient degree. To guard against this inconvenience, let a chain of the same weight, *per* foot, be appended at the bottom of each coffer, of such a length as to reach within a few yards of the ground where the coffer is at its greatest height (see fig. 2); it will act with its whole weight upon the highest coffer, while in this position; but, as that gradually descended, the chain would reach the ground, and being there supported, its weight would be diminished in proportion to its descent; while the weight of the chain on the opposite side would be augmented in the same proportion, so as to counterpoise each other exactly, in every situation, until the uppermost chain was raised from the ground. After which it would increase its weight no more; and, of course, would then give the under coffer that preponderance which is necessary for preserving the machine steady. The under coffer, when it reached its lowest position, would touch the bottom on its edges, which would then support it, and keep every thing in the same position, till it was made lighter for the purpose of ascending.

"What constitutes one particular excellence of the apparatus

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here proposed is, that it is not only unlimited as to the extent of the rise or depression of which it is susceptible (for it would not require the expenditure of one drop more water to lower it one hundred feet than one foot); but it would also be easy so to augment the number of pulleys at any one place, so as to admit of two, three, four, or any greater number of boats being lowered or elevated at the same time, so that let the succession of boats on such a canal be nearly as rapid as that of carriages upon a highway, none of them need be delayed one moment to wait an opportunity of passing; a thing that is totally impracticable where water-locks are employed: for the intercourse, on every canal constructed with water-locks, is necessarily limited to a certain degree, beyond which it is impossible to force it.

"For example: suppose a hundred boats are following each other, in such a rapid succession as to be only half a minute behind each other. By the apparatus here proposed, they would all be elevated precisely as they came; in the other, let it be supposed that the lock is so well constructed as that it takes no more than *five* minutes to close and open it; that is, ten minutes in the whole to each boat (for the lock, being once filled, must be again emptied before it can receive another in the same direction): at this rate six boats only could be passed in an hour, and of course it would take sixteen hours and forty minutes to pass the whole hundred; and as the last boat would reach the lock in the space of fifty minutes after the first, it would be detained fifteen hours and fifty minutes, before its turn would come to be raised. This is an immense detention; but if a succession of boats, at the same rate, were to follow continually, they never could pass at all. In short, in a canal constructed with water-locks, not more than six boats, on an average, can be passed in an hour, so that beyond that extent all commerce must be stopped; but on the plan here proposed, sixty, or six hundred, might be passed in an hour, if necessary, so as to occasion no sort of interruption whatever. These are advantages of a very important nature, and ought not to be overlooked in a commercial country.

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"This apparatus might be employed for innumerable other uses as a moving power, which it would be foreign to our present purpose here to specify. Nor does its power admit of any limitation, but that of the strength of the chain, and of the coffers which are to support the weights. All the other parts admit of being made so immoveably firm as to be capable of supporting any assignable weight.

"I will not enlarge on the benefits that may be derived from this very simple apparatus; its cheapness, when compared with any other mode of raising and lowering vessels that has ever yet been practised, is very obvious; the waste of water it would occasion is next to nothing; and, when it is considered that a boat might be raised or lowered fifty feet, nearly with the same ease as five, it is evident that the interruptions which arise from frequent locks would be avoided, and an immense saving be made in the original expense of the canal, and in the annual repairs.

"It is also evident that an apparatus, on the same principle, might be easily applied for raising coals or metals from a great depth in mines, wherever a very small stream of water could be commanded, and where the mine was level-free."

Having explained Dr. Anderson's invention, we proceed to describe the present Patentee's improvements in the words of the specification (which improvements, by the way, we cannot help observing, are not very clearly set out.)

These additions and improvements are shown at B, B, in the accompanying figures (see Plate XIV.), only claiming the addition of the chambers for the reception of the boats on leaving and entering the coffers in the first case, and to the increased capacity of the coffer in the other case, without claiming a right to the lift, or to any of the machinery, sluices, or gates used in working the same.

Let there be a sufficient pipe or conduit D, (see figs. 24, and 25,) from the upper level on the right side of the lift to

the lower level on the left, and a similar pipe or drain from the upper level on the left side to the lower level on the right. Let there be a stop rest or stay at the height: the coffer c, will be permitted to rise, by the lower water stopping the descent of the opposite coffer at a few inches below that depth, say three feet; below the bottom of the upper level of the canal, make a chamber or small lock B, to admit the boat A, to and from the coffer. Let the communication with the upper level be guarded by a gate or sluice, and the communication with the coffer by a similar guard or device. Let the lower chamber B, be guarded by a gate or sluice, so as to retain the water at three feet, or a suitable height above the top level of the lower canal, and at a sufficient distance from the end of the lower coffer, to get the boat therein.

To get the boat from the lower to the higher level of the canal, let the boat A, be drawn into the chamber B, and the upper coffer C, be secured from descending by a stop or trigger, or other device; the gate being shut, and water being admitted by the conduit or pipe D, the boat will rise as in a lock, till being on a level with the coffer C, it may be admitted, and the gate shut: when the water may be discharged from the chamber B, into the lower level of the canal.

The action of the machine being then ready, the man below rings a bell; the man above having been till this time preparing to get a boat from the higher to the lower level of the canal. The boat A, on the upper level of the canal, must be drawn into the chamber B; the gate being shut to cut off the communication with the upper canal: the water in the chamber B, must be let down through the pipe D, to the lower chamber B; when the boat A, descending as in a lock to the level of

the coffer c, the gates may be opened, and the boat passed into the coffer; and having shut the gate of the chamber and the gate of the coffer, the stop may be removed, and the coffer with the boat be allowed to descend.

The same effect may be produced by letting coffer c, fig. 26, be made water-tight, to twice the depth of the lower canal, with gates to the same at each end; one pair to retain the water to about the depth of the canal, another pair above the same height, each pair opening independent of the other: the lower gates falling on the bottom of the coffer, the upper gates so hung as to draw to the top of the coffers, the boats being intended to pass between these gates.

The action of the machine will then be to get a boat from the lower level to the upper level of the canal. Let the lower coffer c, be filled with water, so as to descend to the bottom of the canal, when the upper coffer must be stopped and retained by a trigger, or firm support; then the water must be let out of the lower coffer to the level of the lower canal, when the boat A, may be drawn into the coffer: the gate must be shut, and being then prepared, the man below rings a bell, the man above having put a boat into the upper coffer, or having filled it with water to the height of the lower gates of the coffer, and being prepared with a friction wheel or band, to prevent the too rapid descent for the first two or three feet, may proceed to lower the coffer; when the operation may be continued alternately, changing as it may be found necessary.

It may be observed, that letting out water from the ascending coffer at times when the lower level of the canal may be a few inches higher than usual, will facilitate the operation.

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N. B.—The first plan of having a chamber in the manner of small locks, at the head and foot of the lift, is safest and best; the latter, of doubling the capacity and depth of the coffers, though applicable in some instances, seems less desirable, on account of the great care requisite in lowering them through the first three feet of their descent.—[*Inrolled in the Inrolment Office, September*, 1834.]

To Alexander Shanks, Jun., *flax-spinner, in Arbroath, in the county of Forfar, in North Britain, for his invention of certain improvements in machinery for preparing and dressing hemp, and other fibrous substances.*—[Sealed 15th January, 1835.]

These improvements in machinery for preparing and dressing hemp, and other fibrous substances, consist, first, in an improved arrangement and construction of machinery or apparatus for separating or releasing the fibrous parts of hemp, flax, and other textile plants from the boom, bark, and other woody matters, in order that the textile fibres of such platns may be softened and prepared for the subsequent process of heckling. Secondly, in the adaptation of a set of rubbing surfaces to a bobbin and fly frame, or other spinning machinery, in order that the fibres of hemp, flax, or other materials, may undergo a second process of rubbing or preparing, by which the fibres may be softened, separated, or refined, previous to their being conducted to the spindle and flyer. Figs. 1, and 2, Plate XVI., represent the mechanism which constitutes the first of my im-

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provements. Fig. 1, is an elevation of one side of the machine; fig. 2, is a horizontal view, exhibiting the top of the machine; fig. 3, is a front elevation; and fig. 4, is a longitudinal section, one of the side frames being removed to show the working parts: *a*, *a*, *a*, is the framework or standards of the machine; *b*, is the main shaft or axle, turning in proper bearings on the lower part of the framework, and receiving its rotary motion by a band passed from a steam-engine, or other first mover, to the fast and loose pulley mounted on its end; *c*, *c*, are two auxiliary shafts or axles, placed parallel to the main shaft, also turning in bearings in the framework; these receive rotary motion from the toothed wheel *d*, mounted on the main axle, which gears with two other similar wheels *e*, *e*, mounted on the ends of the auxiliary shafts *c*, *c*, whereby they all have a continuous and equal rotary motion. Upon each of these three shafts there are formed two cranks *g*, *g*, or small radii, connected in the usual way to vertical rods *h*, *h*, *h*, which are attached to the plates or rubbing pieces *i*, *i*, *i*, *i*, above. These plates are placed in pairs across the machine; one plate of each pair bears against the stops or guides *k*, *k*, fixed to the side frame, which are furnished with small anti-friction rollers (see fig. 4); the other plates are pressed towards, and kept in contact with, their fellow plates by springs *l*, *l*, *l*, affixed to the side frames, which springs act against anti-friction rollers at the back of the other plates.

Through the central part of the other plate a long slot or opening *m*, is formed (see fig. 3, and the detached face view of one of the plates at fig. 5); this slot is for the purpose of allowing the hemp, flax, or other fibrous material to be introduced between the

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rubbing surfaces, and also to allow it to pass through the machine.

Four or more pairs of fluted or grooved rollers are mounted in the end frames, turning in bearings. The upper rollers of each pair bear upon the lower ones, and are kept down in contact with them by means of the horns *o, o, o, o*, which rest upon the ends of the axles of the rollers, and are pressed by levers *p, p*, having their fulcrums in slings or bridle pieces attached to the side frame. These levers are furnished with adjustable screws to regulate the pressure; and from the ends of these levers the rods *q, q*, are suspended, being connected at the lower ends to the weighted levers *r, r*: by these means any required pressure can be given to the upper fluted rollers. The lower fluted rollers receive their motion in the following manner:—Upon the end of the main shaft *b*, is mounted the pinion *s*, taking into the spur wheel *t*, which turns upon a pin or short axle projecting from the side frame. Upon the boss of this wheel *t*, is formed a pinion *u*, which takes into gear with another wheel *v*, also mounted upon a projecting pin or axle, and carrying another pinion *w*, gearing with the toothed wheels *x, x*, mounted on the end of the axles of the two middle lower fluted rollers (see fig. 1.).

By these means both the wheels *x, x*, and the two inner rollers, receive rotary motion in the same direction. The wheels *x, x*, also take into gear with the other intermediate spur wheels *y, y*, mounted upon studs or axles, which spur wheels take into gear with two other wheels *z, z*, mounted upon the ends of the axles of the two outer rollers. By these means all the rollers have a continuous rotary motion in the same direction, and cause them to draw or conduct through

the machine the stalks of flax, or other fibrous or textile substances placed between them, the indentation on the periphery of the rollers crushing or breaking and loosening the boom and bark.

The inner surfaces of the rubbing plates are grooved or roughed, as shown in fig. 5, for the purpose of producing a greater effect upon the hemp, flax, or other fibrous materials. It will be seen by the connexion of the plates with the crank shafts or axles *b*, and *c*, that, as they revolve, the cranks give to the plates *i*, *i*, reciprocating up and down movements; and as the stalks of the plants, in passing through the machine, conducted by the fluted rollers *n*, *n*, *n*, *n*, are gathered in between the plates, their reciprocating action produces that degree of rubbing which separates the boom and bark, and at the same time softens and loosens the fibres.

The person attending the machine places upon the feeding table or endless cloth a proper quantity of the hemp, flax, or other fibrous material, to be operated upon, which is conducted between the first pair of fluted rollers *n*, *n*, where it becomes partially crushed, and the boom and bark broken and loosened; from the first pair of rollers the material is conducted through the openings or slots *m*, *m*, and is gathered between the plates or rubbing surfaces *i*, *i*, from whence it passes between the next pair of rollers, and from thence to the second pair of rubbing plates, and so on to the last or delivering rollers at the reverse end of the machine, where the prepared hemp, flax, or other textile material may be taken to a heckling machine, where it may be heckled and combed in the usual manner for the after processes of roving and spinning.

The second part of my improvements (in which the fibres of the hemp, flax, or other textile plants, formed

into rovings, undergo a further process of rubbing or refining, previously to their being spun into yarns,) is shown at fig. 6; which represents a front elevation of a spinning machine, of the usual construction, with the rubbing surfaces adapted to it. Fig. 7, is an end elevation of the same; and fig. 8, a partial plan view, showing the arrangements for putting the rubbing surfaces into motion. The construction of the spinning frame being well understood, and forming no part of my invention, it will not be necessary for me to describe it; but only to show the mode of applying the rubbing surfaces thereto, and actuating the same.

The rovings of hemp, flax, or other fibrous material, are wound upon bobbins or spools *d*, *d*, and placed in the spinning frame, as usual; from whence the rovings are conducted to an additional set of retaining rollers *b*, *b*, placed above the ordinary retaining rollers *c*, *c*, and are actuated by a pinion *e*, on the end of one of the axles of the lower rollers *c*. Between these two sets of retaining rollers the rubbing plates, bars, or surfaces *f*, and *g*, are placed, extending across the machine, their ends sliding in bearings or guides *h*, *h*, in the end frames. The ends of each of the rubbing plates or bars are joined to the two connecting rods *i*, *k*, which are attached in the usual manner to the cranks *l*, *m*, formed on the end of the horizontal shaft *n*, turning in bearings formed on brackets, projecting from the end framework of the machine. The shaft *n*, is actuated by a band *o*, passed from the pulley *p*, on the end of the axis of the ordinary driving drum *q*, the band *o*, passing over a pulley *r*, mounted on the lateral shaft *n*, and giving it the required motion.

The rubbing bars or plates may be roughed or grooved at those parts where the rovings pass between

them, if it should be thought desirable, or they may be furnished with leather, or any other substances, to suit the different textures of various materials. The rubbing surfaces are kept in contact by the pressure of the springs, placed on a cross bar , of the frame, and adjusted by a set screw *u*.

Having now described the nature of my improvements in machinery for preparing hemp and other fibrous substances, I wish it to be understood that I do not mean or intend to claim, as my invention, all the parts which I have found it necessary to describe; for instance, I do not claim the application of rubbing surfaces, either roughed or plain, for the purpose of preparing hemp, flax, and other textile plants, as they have been applied to this purpose for many years: neither do I claim the application of the fluted rollers for breaking or crushing the boom and bark, in preparing rough hemp and flax; but I claim as my improvements, the arrangement and construction of the machine above described under the first head of this my specification, such machinery having several pairs of fluted rollers connected with several pairs of rubbing surfaces, both of such rubbing surfaces being moved reciprocally to and fro in opposite directions, whereby the fibres of the hemp, flax, or other materials are not so liable to be broken, as when one plate or rubbing surface is stationary, and the other moving; and, secondly, I claim as my improvement the application of the extra set of retaining rollers, and the rubbing surfaces to ordinary spinning frames or machines, for the purpose above stated; namely, that of submitting the fibrous materials to a second rubbing after it has been formed into a roving, and before it descends to the bobbin and flyer, to be twisted or spun into a yarn or thread, such second

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rubbing, softening, and refining the textile fibres, and allowing them to be spun into a finer yarn.—[*Inrolled in the Rolls Chapel Office, July,* 1835.]

Specification drawn by Messrs. Newton and Berry.

To JOHN BUDD, *of Liverpool, in the county palatine of Lancaster, merchant, for a certain improvement or certain improvements in printing silk, cotton, calico, or other fabrics, and in the manufacture of blocks, cylinders, or rollers, used for such purposes.*—[Sealed 27th January, 1835.]

THE Patentee describes his improvements in the following words:—"My invention consists in the substitution (in the printing of silk, cotton, calico, or other fabrics) of engraved plates, blocks, rollers, or cylinders of zinc, alloyed with tin, instead of plates, blocks, rollers, or cylinders of copper, brass, &c. The chief advantage and improvement arising from the use of such plates, blocks, cylinders, or rollers of zinc, alloyed with tin, consists in their great economy, as their first cost will be considerably less than the present first cost of copper, plates, blocks, rollers, or cylinders; and the loss, when worn out, will be much less than the loss at present incurred in the resale (as old metal) of worn-out coppers or brass plates, blocks, cylinders, or rollers.

"Another improvement and advantage arising from my invention, consists in the increased facility and economy with which such rollers of zinc, alloyed with tin, can be manufactured, compared with copper rollers.

"The zinc, which should be obtained as pure as possible, after being melted in the usual way, should receive the addition of tin. The proportion of tin which I have found to answer best is, ten parts of tin to one hundred parts of zinc; but these proportions may be varied advantageously, according to the quality of the metals. The metal, or alloyed metal, after a due mixture has been effected by stirring, should be poured into moulds of sand, of the necessary length and shape. It may be cast into hollow cylinders, by employing a core, and the metal will be found sufficiently solid. These cylinders, blocks, &c., are to be turned hollowed, and fitted to mandrils, or flatted for plates; the surface hardened by hammering, planished, burnished, engraved, &c. &c., in the usual way of preparing metal plates and rollers for printing. I claim, therefore, as my invention, the exclusive right to employ and to manufacture, in the way I have described, plates, blocks, cylinders, or rollers of zinc, alloyed with tin, for the printing of silk, cotton, calico, and other fabrics."—[*Inrolled in the Rolls Chapel Office, July 27, 1835.*]

Specification drawn by Messrs. Newton and Berry.

ORIGINAL COMMUNICATION.

To the Editor of the London Journal of Arts, &c.

UPON LORD BROUGHAM'S NEW PATENT LAW BILL.

SIR,—I am relieved from the necessity of considering the further clauses, after the fifth, of this Bill, as I proposed to do in continuation, by the notice you have, in

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your last number, taken of the whole Bill, as amended in Committee, with the assistance of Lord Lyndhurst and other judicial peers. With your general observations upon the several clauses of the Bill, most practical men will coincide. The clauses which secure a more certain and effectual administration of justice in actions and suits relative to patent property, are undoubtedly improvements, so far as they go—they are intrinsically valuable as practical law reformations; and as precursors to some more extended legislative amendments, they are entitled to our thankful acceptance. A man whose property is involved in the boa-constrictor foldings of Chancery spoliation, ought to be very grateful for the modicum which may be doled out to him from the Accountant-General's office to keep him from starvation—so will we be for this modicum of patent law legislation.

Now, Sir, there appears to be a kind of conventional understanding between the framers of this new Bill and the patent solicitors of London, that it should pass in its general amended state, as the best thing that can be carried through the two Houses of Parliament at this late period of the session. I have given due attention to the observations you have made in your last number (p. 242,) upon "this fragment of the subject," as you justly term it; and might be disposed to agree, that "as there are some really valuable points, it may be advisable to allow the first act of legislation on the subject of patents to pass even with visible objections on the face of it."

Had my Lord Brougham treated the first Bill sent up from the Commons with the same rational consideration —merely applying himself to technical amendments— we should have possessed two sessions ago the *first*

"wholesome and effective working piece of the machinery of patents"—a better Bill than the present,— with the *second* Bill of the Commons, which embodied the great leading *principles,* for which I have been strenuously contending throughout the whole series of these letters, in full operation by this time.

Sir, in conceding the propriety, or rather the necessity, of getting some Bill through the Houses this session, after so much delay, disappointment, smothering of evidence, and disinclination to meet the question fully and fairly, as to what should be done with the host of Chancery and State abuses and impositions to which inventors are subjected in prosecuting an invention patent—after conceding the necessity of doing something, I do not concede one iota of the principles for which I, in common with every practical, intelligent, and unbiassed man examined by the Select Committee of Inquiry, contended the broad and equitable principles of *cheapness of patents*—of simplicity in the official forms of granting them—of total abrogation of all unnecessary forms—antiquated and useless duties, and their attendant expenses—the principle of rendering one patent a sufficient protection for an invention throughout one undivided "United Kingdom"—the principle of securing patent rights from insidious and treacherous dealing in high quarters to "the upsetting of men's rights," including the rendering it impossible for the future to sell the Royal sign-manual at one hundred guineas per job, by dispensing with it, and its accompanying warrants and seals. I feel impelled, Sir, to reiterate in each letter these necessary *principles* of sound and politic legislation for the protection and encouragement of the inventive talent of this vast empire, because the great *national* benefits which would accrue as the result of legislating upon these principles,

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are neither considered in their relative bearings, nor appreciated as to their immense extent.

There is no master-mind in either House of Parliament that can trace and combine the inestimable advantages which would be secured to the British nation by a full and unshackled exhibition of that mass of dormant talent which lies crushed, unembodied, blasted in its inchoate elements, and rendered equally unavailable to its possessors and to the public, by the operation of the extravagant charges, useless formalities, and excessive stamp duties, to which patents for inventions are subjected.

I have endeavoured, in this series of letters, to impress upon the minds of parties concerned in prosecuting inventions, and upon the attention of the Legislature, the immense importance of this part of the question of patent reform, having been always sure that the technical and judicial ameliorations would be well considered and arranged by able practical men, who understand the necessary adjustment of this latter portion much better than I can pretend to do. I have treated the fees for antiquated duties and no duties—the absurd facilities of the official ceremonials of dark ages—the utterly useless, and, in certain offices, the treacherous formalities of passing patents, with sarcastic elucidation. There was scarcely any other mode by which justice could be done to this complicated subject, or the public attention roused to the consideration of the utter inutility of its labyrinth of processes, for the protection of property, and its entire want of adaptation to the exigencies of a commercial and manufacturing society. The antiquated cumbersome forms of the twelfth century are totally inapplicable to the requirements of the nineteenth.

The injurious consequences of continuing the present

high charges and stamp duties upon patents for inventions, should not be lightly estimated by the Legislature nor the country. Every energy of inventive talent should be brought into full action, to enable us fairly to compete with rival manufacturing countries in foreign markets. Let the public attention be fixed upon the astonishing projects of the mighty genius of Mahomed Ali, intersecting the vast plain of fruitful Delta with navigable canals—establishing arsenals, and forging his own arms in extensive manufactories—creating a powerful navy—constructing his ships with home materials—the port of Alexandria, the finest, probably, in the world, repaired, cleared, and proudly bearing in its ancient basin vessels of war, vying in size and strength with the best of the British navy. Contemplate the further works of this master-genius: mercantile ports forming—railways—cotton works—manufactories established along the banks of broad Nilus—gas-works, steam-engines erected—Egyptian Birminghams, Leeds, and Sheffields, raised upon its sandy plains by magic power of volition, already pouring from numerous shafts their dense masses of smoke into the liquid atmosphere, and making it questionable to the astonished traveller, whether he be in the midst of England's boasted manufacturing districts, or in a land of enchantment.

Let our statesmen and merchants, but, above all, our million of mechanics and manufacturers, for one moment, consider that these stupendous creations of the Egyptian Pasha are executed by hundreds of thousands of men who can labour and subsist upon three farthings per diem,—their families, and provisioning *them* in nature's garden, par excellence, forming no part of the care of Mahomed Ali's Arab manufacturer and labourer. Let a national estimate be made of the prospective results of the combined operations of this gigantic creation of

a manufacturing country in the centre of the eastern commercial world—completed and put into increasing action under Ibrahim Pacha, the intended successor to Mahomed, a man of equal enterprise, and of scarcely less genius; and having made such estimate, a conclusion may be formed of the absolute necessity of removing every obstacle to the full development of the creative powers and inventive talents of our British artists and scientific men—powers and talents that never can be brought into action, whilst Chancery patents for inventions are loaded with formalities, expenses, and taxes.

From the East let us turn our attention for a short period to our neighbour rival in arts and commerce. Contemplate France once more attempting, and finally bursting, the chain of Bourbon despotism—her political institutions purified from the corruptions which have already paralysed the *vis inertiæ* of her charter of liberties—her commercial relations rendered firm by a full confidence in the stability of her institutions—*her* genius and inventive talent fostered and encouraged by a truly national government and an improved patent code. See France, thus renovated, applying her immense resources in national, but honest, commercial rivalry to ours; and then say, if it be of little consequence to our manufacturers and artisans that the inventive talent of this empire should continue to be crippled, and rendered comparatively inoperative, under the blighting system of the heavy and impolitic expenses of our Chancery patents.

Cross the Atlantic—visit free America, with her fifty millions of inhabitants speaking our native language—her political institutions broadly and firmly based upon the pure original *principles* of our own—her gigantic energies totally unfettered by the trammels of antiquated absurdities, and European prejudices and monarchial

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puerilities—*her* public treasury, without a national debt to impair the elastic energy of her vitality—her increasing *public* resources honestly applied to *public* purposes, with united prudence, economy, and liberality—contemplate America looking to the whole south Peninsula as *her* commercial mart—the future consumer of *her* manufactures—the extended storehouse of her rival commodities.

If these extended, but not fallacious, estimates of the powerful competitors to our British skill and enterprise, who are bearing upon our commerce from the opposite points of our globe, will not attract the attention of our artists and inventive mechanics and scientific operatives—if these views of the almost certain results of the immense pressure upon our mercantile proceedings, which must ensue from the future great collisions of foreign speculations, will not induce our legislators to protect and encourage native industry and talent by entirely cutting away the unnecessary expenses of Chancery patents,—if the entire evidence of the enlightened practical men examined before the Committee of Inquiry will not ensure this most important national object, it is in vain further to contest the point. An Egyptian ophthalmia blinds our Government and Legislature to the true interests of this empire, and our manufacturing rivalry must eventually succumb to the accumulated forces bearing with increasing pressure in every foreign mart upon our declining commerce—a pressure ensuring its final extinction.

VINDICATOR.

ERRATA in VINDICATOR'S LETTER, July, 1835, No. XL., Conjoined Series.

Page 303, line 12, &c., *del.*, "for certain subjects requiring long experience to perfect," and read, "for ALL original inventions."
Page 303, line 20, *del.*, "and sixth."

Note.—The Bill, as sent down to the Commons from the House of Lords, has been curtailed in Committee of the Lower House. Clauses V., VI., and VII., have been struck out. Clause V. gave the purchaser of the property in an invention the liberty of obtaining, under certain restrictions, Letters Patent in his own name, with all rights in courts and elsewhere, which the inventor himself might have had. Clause VI. enacted, that in all suits and actions, the date of the petition should be taken as the date of the Letters Patent granted, and protect the invention accordingly. Clause VII. declared that it might be lawful for the Patentee to sell or transfer his right, or to grant licences to any number of persons jointly or severally. There are some technical additions made to the Peers' Bill; but in the clause, now No. V., respecting the service of notices of any objections intended to be relied on in any action of infringement, or *scire facias,* the words "twenty-one days at least" are left out of the enacting part, although they are inserted in the margin. What may be the final intention we cannot state.—Ed.

COURT OF KING'S BENCH.

Before Lord Denman, July, 1835.

MINTER *v.* MOWER.

This was an action for damages for an infringement of the plaintiff's patent right in a recumbent chair. The invention (see our Journal, vol. vii., Second Series, p. 156,) is an easy chair; the back of which swings upon pivots, forming a lever of the first order; the lower end of the back acts against the seat, a lever of the second order, which rises upon hinge joints; and by means of this compound leverage, a person reclining in the chair is enabled, by the slightest exertion, to bring the back

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and the seat to an obtuse angle, or any degree of obliquity which may be conducive to his comfort. The defendant made and sold several chairs of the same construction prior to the date of the plaintiff's patent, with the addition of a ratchet and spring bolt, for the purpose of fixing the compound levers, that is, the back and seat, in any required position.

The jury first found for the defendant, on the ground that the construction of this chair was not new at the time of granting the patent; but, under the advice of the judge, they afterwards found for the plaintiff, on the ground that, as the defendant's chair had a stop to fix its levers in any desired position, it did not vibrate freely upon its joints; it had not a constant undulating movement whenever the person seated changed his position, called by the Patentee a "*self-adjusting leverage;*" therefore, the plaintiff was the first discoverer of the principle.

It is scarcely necessary to say, that this very extraordinary and novel verdict was received under permission that the defendant might move the Court for a nonsuit.

SCIENTIFIC NOTICES AND NOVEL INVENTIONS.

RAILWAYS.

A Bordeaux journal mentions the project of an iron railway from Bordeaux to Bayonne, by the Grandes Landes. The numerous railways now in course of completion upon various lines throughout France will prove of the greatest advantage to its internal commerce. It is not generally known that the

earliest proposition to the French Government, for its countenance to the establishment of iron railways, was made so early as the year 1817, to M. M. le Compte Corvetto, then Minister of Finance. An extensive project was submitted through him to the Administration, for the establishment of an iron railway, traversing France from the port of Dunkirk to that of Marseilles, with the view of bringing the trade of India and the Levant through France, to the northern parts of Europe. The plan embraced a proposition for a general treaty between France and the commercial States, and that the railway should be guaranteed by France as a public passage for all merchandise during periods of war, as well as of peace; and that no seizure, embargo, or confiscation should ever be allowed, on account of the political relations between France and the other contracting powers. This gigantic plan was discussed by the French Administration and the Paris bankers, and was laid aside principally on account of the extensive funds required for its completion. The projector, under the sanction of the Administration, attempted to raise a company in London, but failed; and the scheme was laid aside for the time. How far the railway, through the isthmus of Suez, and the expected benefits of shortening the route to India, by bringing the merchandise by way of the Red Sea and Suez, may warrant the expectation of advantage in the resumption of the Marseilles iron railway project, may be a matter of speculation. The greatest difficulties now yield to the effective combinations of science and capital.

MODEL ANATOMY.

The Museum at Florence has always been rendered interesting to strangers by its collection of anatomical wax models, representing all the various parts of the human body as they appear in different stages of dissection. The most celebrated artist in this kind of work was Antonio Serantoni, who, after many years of the most patient labour, succeeded in completing an entire figure for the University of Bologna. This exquisite specimen of workmanship excited the utmost attention of the philanthropist, M. Dupaty, upon his visit to Florence. In his thirty-third

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"Lettre sur l'Italie," he writes, "Vous voyez toutes les pièces les plus secrètes de cette machine si compliquée d'abord isolées, ensuite rassemblées réunies; et toutes prêtes à remplir à leur tour et à leur place la partie qui les concerne—toutes prêtes à vivre. Ce type en cire a consommé mille cadavres. Quel travail! quelle patience! mais aussi quel beau monument!"

IMPROVEMENTS IN EGYPT.

The two remaining branches by which the Nile has discharged, for many years past, its waters into the Mediterranean Sea, are those of Damietta and Rosetta; the point of separation is about fifteen miles below the city of Cairo. By command of Mahomet Ali, a vast undertaking is in progress, for the purpose of raising the waters of the Nile to a sufficient elevation, so as to ensure the general and equal navigation of the whole of the Delta at all seasons of the year. The advantages arising to the country from the execution of this immense work will be beyond computation; it is carrying on under the direction of M. Lenon, a French engineer. A canal is digging, with dams and locks, for the service of each branch. These two canals will receive the whole waters of the Nile; they are each about 1,300 feet in breadth, and 32 in depth, and will form the new channels as well as the reservoirs for the river; they are cut inside the present natural channels, that is, closer to each other than the two actual beds of the river are. From these two main reservoirs, a main supply canal will be cut in a straight line through the Delta, with ramifications throughout the country. The piles for this great undertaking will be imported; the stone necessary for the work is found in the quarries near Cairo. About 10,000 men are at present employed in the works, which M. Lenon expects to complete in six or seven years time.

CANAL OF MAHOMMADIE.

This is another of those great works that show the expansive mind and enterprising genius of the present sovereign of Egypt. The shallows at the mouths of the Nile have greatly impeded the navigation. Mahomed Ali planned a canal for the river to the port of Alexandria; 100,000 men were set to work; in two years

a canal, fifty miles in length, eighty to ninety feet in width, and about six feet deep, has been completed. There are no locks upon it, but only a gate at each end. This canal is now the only route of intercourse between Alexandria and Cairo; it is thronged with boats of all sizes, which are drawn by men when they cannot use their sails.—*American Journal of Science.*

MAHOMED ALI AND HIS MANUFACTORIES IN EGYPT.

Mahomed Ali may be considered the greatest sovereign of the age; he is well worthy of a notice even in a scientific journal. We can scarcely travel a mile through the country without finding some marks of his restless enterprise, and much of this is on a very magnificent scale. The port of Alexandria is filled with his men-of-war, the large ships being all of one hundred guns, or more. Alexandria itself is rapidly improving; the Pacha is erecting a number of large houses on the European plan. Next we come to the canal of Mahommadie: near the further end of it, at Fouah, is a large cap manufactory, erected by Mahomed Ali: proceeding up the river, we come at intervals to his immense granaries. Approaching Boulac, the port of Cairo, our attention is drawn to a number of buildings, with high chimneys, from which the smoke is puffing, as if we were in the neighbourhood of Birmingham or Sheffield. They are the Pacha's cotton manufactories and iron founderies, *and are said to be but a small part of what have sprung up within a few years under this powerful magician.* We went through one of the manufactories, and found them just putting into operation a twenty-horse steam-engine, from London. The large columns supporting the second story of the building were of cast iron; and the looms, of which I counted more than a hundred, were of the same material. It was curious to find this, and also a cotton printing establishment, and a manufactory of machinery attached, all in active operation, and to see the half-naked Arabs darting about in their several employments. In addition to the foundery at Boulac, the Pacha has also extensive iron-works in the citadel of Cairo, where he is able to manufacture one hundred muskets per diem; this manufactory is also in the most active operation. He has

also schools preparatory for civil service, as well as for the army and navy, connected with his palace in the citadel. In strong contrast, however, with all this, is the condition of his subjects; this is most pitiable. I have no where seen such abject misery; he makes them till every foot of ground, takes from them the fruits of their labour, and fills his granaries, allowing them a bare sufficiency! There are no schools; and, indeed, I could not hear of a single effort to raise or improve the condition of the people; every thing is of a contrary tendency; and with fine active forms and quick capacities, they are the most abject set of beings any where to be found!! When Mahomed Ali conceived the plan of his canal, he sent soldiers into the country; the natives were driven down in crowds, tied by the neck, in companies of a dozen or more, to a pole: thus driven to the ground, in a few months more than one hundred thousand men were at work along the course of the canal! Ibrahim Pacha, the son of Mahomed's favourite wife by a former husband, is to succeed him.—*Ibid.*

COAL-MINE AT CARNAYL, ON MOUNT LEBANON.

In connexion with the improvements under Mahomed Ali, it may be interesting to learn that a bed of coal has been recently discovered at Mount Lebanon, and that his agents, under the guidance of an English gentleman of sufficient skill, are now exploring it with all the energy that the nature of that region of country will admit. They have carried their investigations to a considerable extent, and, I believe, with satisfactory results. In answer to my inquiries in one of the cotton-manufactories at Cairo, they told me that trial had been made of this coal in their steam-engine, but that although it burned well, it did not produce sufficient heat. The coal now used in the Mediterranean is, I believe, all brought from England; and should this turn out to be an extensive bed of good coal, the advantages to the neighbouring regions will be immense. The mine is about three miles north of the great road leading from Beirot to Damascus, and about eighteen miles from the former city, in lat. 33° 56' N., long. 35° 53'. The bed of coal is about three feet three inches in thickness. In digging for coal at Carnayl, they have brought

a bed of iron ore to light: indeed, in ascending the western side of Lebanon, the oxides of iron ores mingle so largely with the native rocks, as to leave no doubt that this mineral may be procured in very large quantities.—*Ibid.*

COAL TAR AND WATER FOR FUEL.

Mr. Loir stated, that from long experience, he was convinced that water was of no service in generating heat with coal tar, and that three gallons, or thirty-three pounds of coal tar, are equal in heating effect to forty pounds of coke; made from Newcastle coal of the Hulton seam.—*Meetings of the Scientific Associations of Great Britain.*—*Ibid.*

List of Patents

Granted by the French Government from the 1st of October to the 31st of December, 1834.

PATENTS FOR FIFTEEN YEARS.

To Jean Charles Ehrhart, of Paris, for an improved organ.
— Auguste Soudain, of Paris, for a stand for the guitar.
— Martin Varigar, of Paris, for an elastic strap for gentlemen's trousers and gaiters.
— Madame Dupy, of Paris, for a siphon for pouring out champagne, without drawing the cork.
— Charles Picot, of Chalons, for an improved machine for cutting wood in thin sheets for cabinet-makers.
— Maurice Antoine Dunand, of Paris, for a new lamp burner.
— Lefroy, engineer, of Paris, for improvements in stoves.
— Joseph Vernet, of Paris, for an improved lamp.
— Joseph Louis Lewinte, for an apparatus for evaporating liquors by means of hot air.
— Bernard Heine, of Wurtzburgh, for a new surgical apparatus.

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To Kriegelstein, and Arnand, of Paris, for improved medicine chests.
— Alexandre Francois de Bain, for a new mechanism, applicable to upright and square pianos.
— Normand, of Lacharité, for a machine for spreading on the ground powdered lime and plaster.
— Jeane Michel Reinhard, of Strasburg, for improvements in mills.
— Toussaint Colté, of Epinals, for a new method of fixing wheels to axle trees.
— Delinée and Jouval, of Paris, for an improved method in packing up ladies' bonnets.
— Claudot Dumont and Pluvinet, of Paris, for a new process of manufacturing animal charcoal for clarifying sugar.
— Gilbert Lamotte, of Paris, for improvements in water closste.
— Etienne, Réné Berthe Noel, for a method of using cotton, or other fabrics in the binding of books.
— Roftin and Rozé, of Paris, for an improved plough.
— Henri Brewer, of London, for a triple or quadruple air pump, to be used in the manufacturing of paper.
— Isidore Tourrette, of St. Etienne, for an improved gun, to be loaded at the breech.
— Hubert Blondel, of Caen, for an improved billiard-table.
— Hubert Michel, of Paris, for a new method of lighting up public establishments, by means of reflectors.
— Auguste Barbier, of Paris, for an improved pump, to be used by wine-merchants.
— Louis Joseph Domeny, of Paris, for a moveable sliding fork, to regulate semi-tones in a double-action harp.
— Madame Trichet, of Paris, for an improved binding for books.
— Deleveau, Jun. of Toulouse, for an improved street lamp.
— Francois Debasseaux, for an apparatus for preserving leeches in travelling.
— Gibbons Merle, of London, for a cooking apparatus by mean of gas.
— Charles Hursthouse, of London, for an apparatus for putting boots on and drawing them off.

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To Jacques Gonon, of St. Etienne, for an improved shuttle for manufacturing ribbons.

— Joseph Bazin, of Paris, for an improved paddle wheel for accelerating navigation.

— Belin and Lorillard, of Nuits, for an apparatus for preserving chimneys, from smoking.

— Réné Francois Louis Tollineau, of Tours, for a process of printing white or coloured canvass.

— Thomas Richard, of Foix, for a method of applying hot air to the Catalonian iron mill.

— Pascal Forget, comb manufacturer, of Rheims, for an iron wire webb or tissue.

— Anatole Henri Gerdret, of Paris, for a mineral brush for cleaning shoes and trousers.

— Guillaume Royer, of Nuits, for a machine for jointing and planing the staves of barrels of all dimensions.

— Antoine Lafargue, of Paris, for a new metallic pen, with an ink reservoir.

— Bardet and Mazoyer, of Lyons, for an improved flour mill.

— Koch and Grassel, of Guebwiller, for a machine which makes the water which has driven a water wheel re-act on the same wheel.

— Edward Deleuze, of Paris, for an improved suction pump, with a reciprocating motion.

— Delminique and Laurencon, of Eybens, for a method of burning bricks and tiles by means of anthracite.

— Paul de Baleine, of Nantes, for the application of the endless screw to the windlass and rudder of a ship.

— Pierre Joseph Legrand, of Paris, for a new kind of pen.

— Madame Igloy, of Paris, for balsam calculated to restore youth.

— Jean Boivin, of St. Etienne, for a mechanical power, actuating ribbon frames.

— Mayer and Romancé, of Paris, for an oscillating steam-engine, with registers, moved by an excentric.

— Jean Baptiste Narcisse Wallet, for an optical instrument, by

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the agency of which old persons are taught to read with great facility.

To Joseph Clostre, of Paris, for a new kind of tubular ornament, made of brass, or other metal.

— Henri Napoléon Brewer, for a triple air-pump, to be used in the manufacturing of paper.

— Joseph Werdet, of Paris, for two methods of making the madder dye penetrate to the heart of the threads, which form a woollen tissue, and thereby rendering the dyeing in the piece equal in every respect to the dyeing in the wool.

— Hyacinthe Marie Lauzet, of Paris, for a sugar called by him orgeat sugar.

— Christophe Devaureix, of Paris, for a new method of scouring the skins of animals, and preparing them for tanning.

— Louis Legrain, of Vienna, in Austria, for a new fire-arm, with improved primers.

— Joseph Bernard Racine, of Paris, for an improved walking-stick.

— Tardy de Montravel, of Embrun, for a new lithographic press, with springs.

— Martin, of Bethun, for a method of reviving animal charcoal.

— Desprez Guyot, of Paris, for a new kind of crayon.

— Pierre Marie Emorine, of Lyon, for a self-feeding fire-engine.

— Madame Voisin, of Lyon, for a cosmetic to remove sun freckles and other spots from the face.

— Duchamp, father and son, of Lyon, for an improvement in looms for weaving silk.

— Auguste Fréderic Jacques Saty, of Laferé, for a method by which writing may be learnt without the help of a master.

— Jean Noel Santini, of Marseille, for a prepared pasteboard or parchment, to be used for writing, &c., in lieu of a slate.

— Pierre Arnult, of Bordeaux, for a machine for cleansing privy vaults.

— Echarcon (paper-manufactory of), for a method of preparing paper and pasteboard, so as to render it less combustible than it generally is.

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To Auguste Koch and Co., of Guibwiller, for a method of employing the waste cotton generally lost in cotton manufactories, and producing with it a new fabric.

— Julien Pierre Gasche, of Paris, for a new method of winding up and setting a clock by the socle or pedestal, without raising the glass covering.

— Laillet and Smith, of Switzerland, for a new fire-engine.

— Martial Guillet, of Toulouse, for a new kind of suspended coach, without axle-tree, poles, or boxes, to the wheels.

— Henri Sanford, of Paris, for improvements made in the machine for manufacturing continuous paper.

— Jacques Henri Golay, of Lyon, for an improved stay, for correcting any deviations in the shape of young people.

— Pierre Duchene, of Givry, for an improved knife, with several blades.

— Jonval and Pigallet, of Paris, for a system of hydraulic pression, applicable to syringes.

— Weinling, of Strasbourg, for a new water-proof tissue.

ADDITIONAL SPECIFICATIONS INROLLED FOR IMPROVEMENTS BY THE FOLLOWING PATENTEES.

To Etienne Merckel, represented in Paris by Mr. Perpigna, on his fire bottle.

— Etienne Francois Perinet, on his keyed bugle.

— Francois Gabet, on his improved system of rail-roads.

— Auguste Moineau, on his motive power.

— Felix Jean Baptiste Piot, second improvement on his new system of rail-roads.

— Felix Jean Baptiste Piot, third improvement on the same.

— Charles Dient, on his improved stand for globes.

— Pierre Hilaire Galibert, on his mechanical lamp.

— Edme Enfer Beon, on his double-action bellows.

— Casimir Lefaucheux, second improvement on his new fire-arm.

— Casimir Lefaucheux, third improvement on his same.

— Malortic and Vallery, on their machine for grinding and pulverising logwood.

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To Jacques Antoine Frigerio, on his improved process of manufacturing pease for issues.

— Felix Clein, on his method of manufacturing shoes and boots.

— Paul Carcenac, as transferee of Mr. Breugnot, on his system of substituting zinc to lithographic stones.

— Milly and Motard, on their method of converting fat into soap by means of lime used in closed vessels.

— Henri and Perrin Lepage, second improvement on their new fire-arm.

— Taurin Junior, on his improved piano.

— Louis Charles Riottot, on his elastic porte-crayon.

— Louis Jules Sellier, on his new cartridge box.

— Charles Louis Derosne, on his system of decolorating syrups.

— Antoine Gérand, on his hewntostatic lamp.

— Francois Berjon, on his new horse-shoe.

— Louis Pierre Marie Louvrier, as transferee of Mr. Trappe, third improvement on his apparatus for refining sugar.

— Jean Nicolas Toussaint Delsarte, on his process for preserving balm.

— Jean Clement Lambert, on his improved baths.

— Simon Alleau, on his distilling apparatus.

— Jean Baptiste Cluesman, on his new method of tuning pianos.

— Louis Quantin, on his improved carriage.

— Grillet and Trotten, on their new system of ornamenting shawls.

— Jean Christophe Gotten, on his hydraulic lamp.

— Joseph Marleix, on his method of applying caoutchouc to the manufacturing of gentlemen's stocks.

— Pierre Theodore Pepin, on his new mill for hulling corn.

— Pierre Foissac, on his motive power.

— Francois Mothes, on his instrument for making gelatinous capsules.

— Caiman Duvergier, on his new spinning wheel.

— Pierre Charles Marie Fraictier, second improvement on his method of twisting and throwing cotton and other substances.

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To François Alexandre Sellique, second improvement on his new gas-light.

— Ventouillac and Lanarbé, on his apparatus for drawing the silk from the cocoons.

— Jean Francois Bonaventure Bozon, on his improved method of manufacturing shoes and boots.

— Jean Baptiste Gille, on his new clock with escapement.

— Denis Peyre, fils, on his frame for making plush and velvet.

— Jaillet Junior, tenth improvement on his frame.

— Parfait Modeste Charpentier, on his mechanical easy chair.

— Claude Allier, on his chronometer, applicable to navigation.

— Lefevre and Serrurot, on their blacking.

— Nicholas Frederic Charoy, on his alarum fireworks.

— Benigne Joanne, on his lamp.

— Antoine Galy Gazalat, fifth improvement on his steam-coach, capable of running on common roads.

— William Wayte, on his improved steam-engine.

— Hamond and Renaud de Vilback, on their locomotive carriage to be used on common roads.

— Léon Castelain, on his method of manufacturing white vinegar and alcohol from a substance not hitherto used for that purpose.

New Patents
SEALED IN ENGLAND,
1835.

To William Crofts, of New Radford, in the county of Nottingham, machine-maker, for his invention of certain improvements in certain machinery for making figured or ornamented bobbin-net, or what is commonly called ornamented bobbin-net lace, part of which improvements are extensions of certain improvements for which letters patent have been granted to him, bearing date the 27th day of May, 1834.—Sealed 26th June—6 months for inrolment.

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To Thomas Walker, of Burslem, in the county of Stafford, mechanic, for his invention of improvements in extinguishers to candles, and in the application of such extinguishers to candles and candlesticks.—Sealed 3d July—2 months for inrolment.

To James Kean, of Johnston, in the county of Renfrew, in the kingdom of Scotland, machine-maker and engineer, for his invention of an improved throstle-flyer, or a substitute for an ordinary flyer, employed in spinning cotton, flax, hemp, wool, silk, and other fibrous substances.—Sealed 3d July—6 months for inrolment.

To Henry Vint, of Lenden, in the borough of Colchester, in the county of Essex, Esq., for his invention of certain improvements in paddle-wheels.—Sealed 9th July—6 months for inrolment.

To Richard Coad, of Liverpool, in the county of Lancaster, manufacturing chemist, for his invention of certain improvements in the means or apparatus for consuming smoke, and economising fuel in furnaces, which improvements are particularly applicable to furnaces of steam-engines, ~~employed for navigation~~ and other purposes.—Sealed 10th July—6 months for inrolment.

To William Bush, of Bankside, Surrey, engineer, for his invention of certain improvements in propelling boats, ships, or other floating bodies.—Sealed 10th July—6 months for inrolment.

To John Rogers, of Princes-court, Westminster, in the county of Middlesex, gentleman, for his invention of certain improvements in paddle-wheels.—Sealed 10th July—6 months for inrolment.

To Conrad George Kuppler, of Nuremburg, at the Polytechnical Institution, but now of Birmingham, for his invention of certain improvements in the construction of weighing machines, and other machines used in ascertaining weight.—Sealed 11th July—2 months for inrolment.

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To Frederick Herbert Maberly, of Bourne, in the county of Cambridge, clerk, for his invention of a new method of propelling vessels.—Sealed 13th July—6 months for inrolment.

To Joseph Chesseborough Dyer, of Manchester, in the county of Lancaster, machine-maker, and James Smith, of Deanstone, in the county of Perth, in North Britain, cotton-spinner, for their invention of certain improvements in machinery used for winding upon spools, bobbins, or barrels, slivers, or rovings of cotton, wool, and other fibrous substances of the like nature.—Sealed 17th July—6 months for inrolment.

To William Vickers, of Sheffield, in the county of York, merchant, for his invention of improvements in machinery, for preparing or shaping steel for the manufacture of files and rasps.—Sealed 17th July—2 months for inrolment.

To Joseph Henri Jerome Poittevin, of Craven-street, in the county of Middlesex, gentleman, for a powder which is applicable to the purposes of disinfecting night-soil and certain other matters, and facilitating the production of manure, being a communication from a foreigner residing abroad.—Sealed 17th July — 6 months for inrolment.

To Thomas Horne, of Aston, near Birmingham, in the county of Warwick, brass-founder, for his invention of certain improvements in the manufacture of hinges.—Sealed 24th July—6 months for inrolment.

To John Dickinson, of Bedford-row, Holborn, in the county of Middlesex, Esq., and William Long Tyers, of Apsley-mill, in the parish of King's Langley, in the county of Hertford, for their invention of certain improvements in the manufacture of paper.—Sealed 24th July—6 months for inrolment.

CELESTIAL PHENOMENA, for August, 1835.

D.	H.	M.	
1			Clock before the ☉ 6m. 3s.
—			☽ rises 0 h. 32 m. A.
—			☽ passes the mer. 5 h. 46m. A.
—			☽ sets 10 h. 46 m. A.
	7	50	☽ in □ or first quarter.
3	16		☽ in Perigee.
5			Clock before the ☉ 5 m. 45 s.
—			☽ rises 5 h. 59 m.
—			☽ passes the mer. 9h. 35m. A.
—			☽ sets 0 h. 16 m. M.
	12	23	☿ greatest elong. 19. 7. W.
8	3	39	Ecliptic oppo. or ○ full moon.
9	1	10	♅ in conj. with the ☽ diff. of dec. 4. 29. N.
10			Clock before the ☉ 5 m. 10 s.
—			☽ rises 8h. 55m. A.
—			☽ passes the mer. 1h. 21m. M.
—			☽ sets 6 h. 17 m. M.
11	15	8	☿ in the ascending node.
15			Clock before the ☉ 4m. 20 s.
—			☽ rises 10 h. 8 m. A.
—			☽ passes the mer. 4h. 57 m. M.
—			☽ sets 9h. 19m. A.
16			Mer. R. A. 8 h. 44 m. dec. 18. 59. N.
—			Ven. R. A. 8 h. 49 m. dec. 18. 41. N.
—			Mars R. A. 12 h. 2 m. dec. 0. 25. N.
—			Vesta R. A. 8 h. 37 m. dec. 20. 6. N.
—			Juno R. A. 5 h. 0 m. dec. 12. 36. N.
—			Pallas R. A. 16 h. 39 m. dec. 17. 19. N.
—			Ceres R. A. 16 h. 46 m. dec. 25. 2. S.
—			Jup. R. A. 6 h. 31 m. dec. 23. 4. N.
—			Sat. R. A. 13 h. 13 m. dec. 5. 15. S.
—			Georg. R. A. 22 h. 5 m. dec. 12. 38. S.
—			☿ passes the mer. 23 h. 11 m.
16			♀ passes the mer. 23 h. 13 m.
—			♂ passes the mer. 2 h. 25 m.
—			♃ passes the mer. 20 h. 52 m.
	1		☽ in Apogee.
	4	8	☿ in Perihelion.
	9	15	☽ in □ or last quarter.
17	13	41	♃'s third sat. will im.
	17	27	☿ in conj. with ♀ diff. of dec. 0. 13. N.
18			Occul. β Tauri, im. 13 h. 18 m., em. 14 h. 10 m.
	15	51	♃'s first sat. will im.
19	15	29	♃ in conj. with the ☽ diff. of dec. 2. 56. S.
—			Occul. ε Gemi, im. 13 h. 36 m., em. 14 h. 31 m.
20			Clock before the ☉ 3m. 17s.
—			☽ rises 0 h. 9 m. M.
—			☽ passes the mer. 8h. 55m. M.
—			☽ sets 5h. 41m. A.
21	22	55	♅ in oppo. to the ☉
22	16	3	♀ in conj. with the ☽ diff. of dec. 3. 55. S.
	23	27	☿ in conj. with the ☽ diff. of dec. 3. 25. S.
23	14	46	♃'s second sat. will im.
24	4	42	Ecliptic conj. or ● new moon.
25			Clock before the ☉ 2m. 3s.
—			☽ rises 6h. 11m. M.
—			☽ passes the mer. 1 h. 46 m. A.
—			☽ sets 8 h. 1 m. A.
26	4	42	♂ in conj. with the ☽ diff. of dec. 4. 11. S.
	12	44	☿ greatest Hel. lat. N.
27			Occul. *Saturn*, im. 5 h. 29 m., em. 6 h. 5 m.
27	5		♄ in conj. with the ☽ diff. of dec. 1. 16. S.
—			♀ in Perihelion.
28	13		☽ in Perigee.
30	16	33	☿ in sup. conj. with the ☉
31	0	53	☽ in □ or first quarter.

J. LEWTHWAITE, Rotherhithe.

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METEOROLOGICAL JOURNAL,

FOR JUNE AND JULY, 1835.

1835.	Thermo. Hig.	Thermo. Low.	Barometer. High.	Barometer. Low.	Rain in inches.	1835.	Thermo. Hig.	Thermo. Low.	Barometer. High.	Barometer. Low.	Rain in inches.
June						July					
26	54	44	29,80	29,56	,275	11	76	54	29,71	29,68	
27	62	44	30,06	29,86	,725	12	74	51	29,73	29,66	
28	64	46	30,12	Staty.	,025	13	69	49	29,86	29,80	,15
29	63	41	30,14	30,08		14	75	49	29,99	29,92	
30	68	45	30,03	Staty.		15	74	45	29,94	29,80	
July						16	74	55	29,83	29,79	
1	72	46	30,03	Staty.		17	78	48	29,96	29,95	
2	77	54	30,00	29,99		18	80	52	29,99	29,96	
3	74	56	30,08	30,04	,025	19	77	48	30,10	30,06	
4	74	58	30,09	30,04		20	80	50	30,10	Staty.	
5	65	51	29,99	29,94	,15	21	80	61	30,14	30,12	
6	74	51	29,96	29,91		22	78	54	30,17	30,16	
7	71	55	29,99	Staty.		23	80	51	30,19	Staty.	
8	70	50	29,91	29,88	,125	24	81	50	30,17	30,15	
9	68	47	29,94	29,92		25	79	54	30,12	30,11	
10	75	51	29,90	298 2							

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37 32 N.
Longitude 3 51 West of Greenwich.

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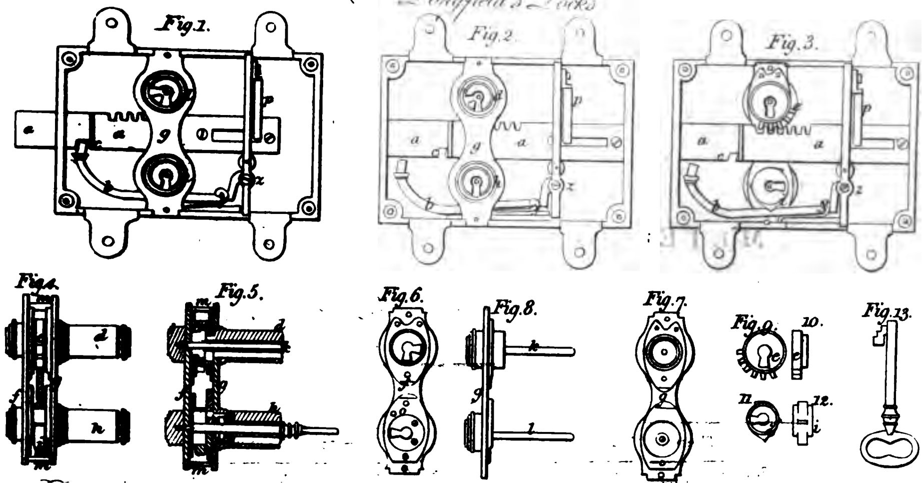
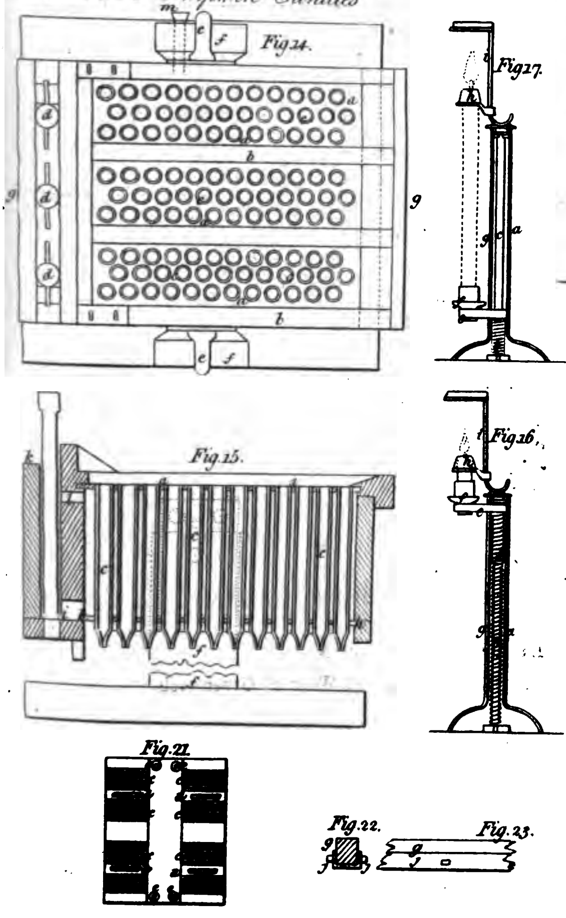
Longfield's Locks



Palmer's Imp.ts in Candles



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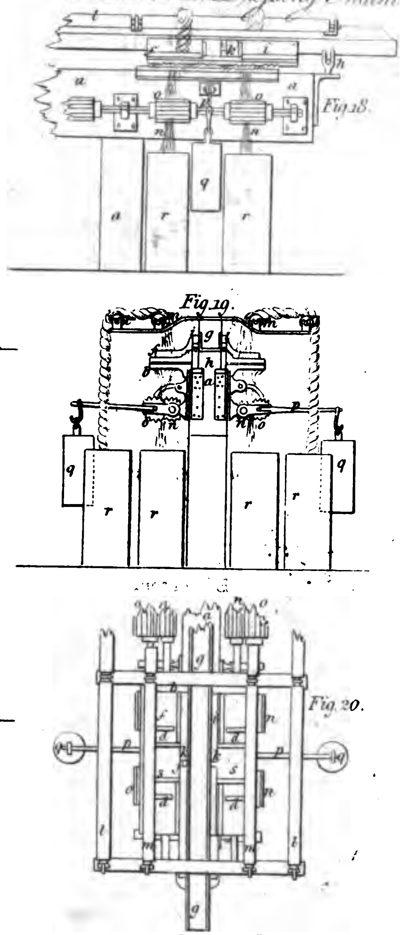

W. Newton Del.t April 1st 1835. S. Bellin Sculp.t

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Clark Nash & Co.s Brick Machinery

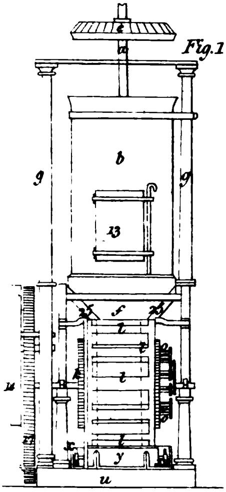
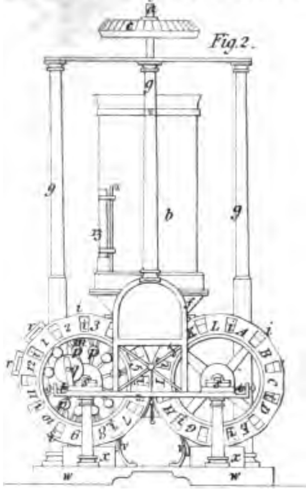


Fig. 1.



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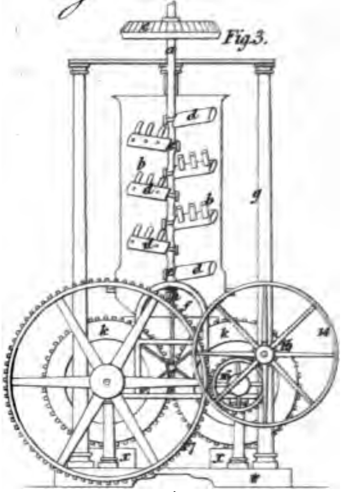

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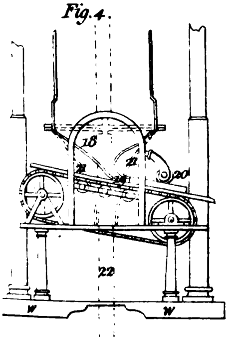

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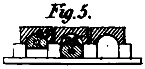
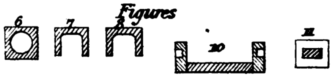


Fig. 5.

Fig. 9.



Figures

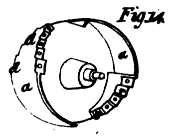


Fig. 14.

Gardner's Turnip Cutter

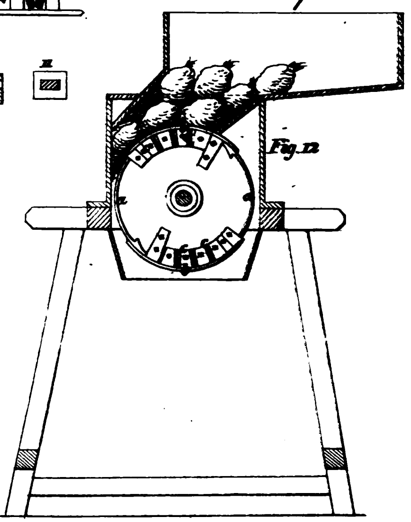
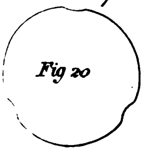


Fig. 12.

Walker's Impd. Wadding



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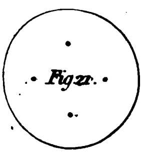

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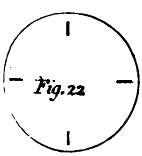

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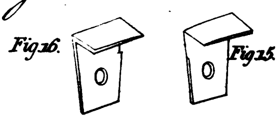

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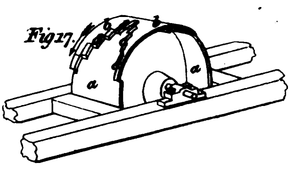

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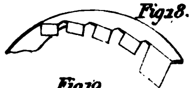

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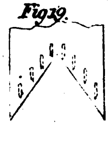

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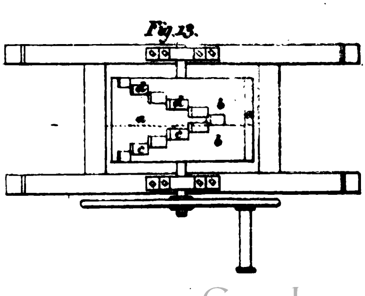

Fig. 13.

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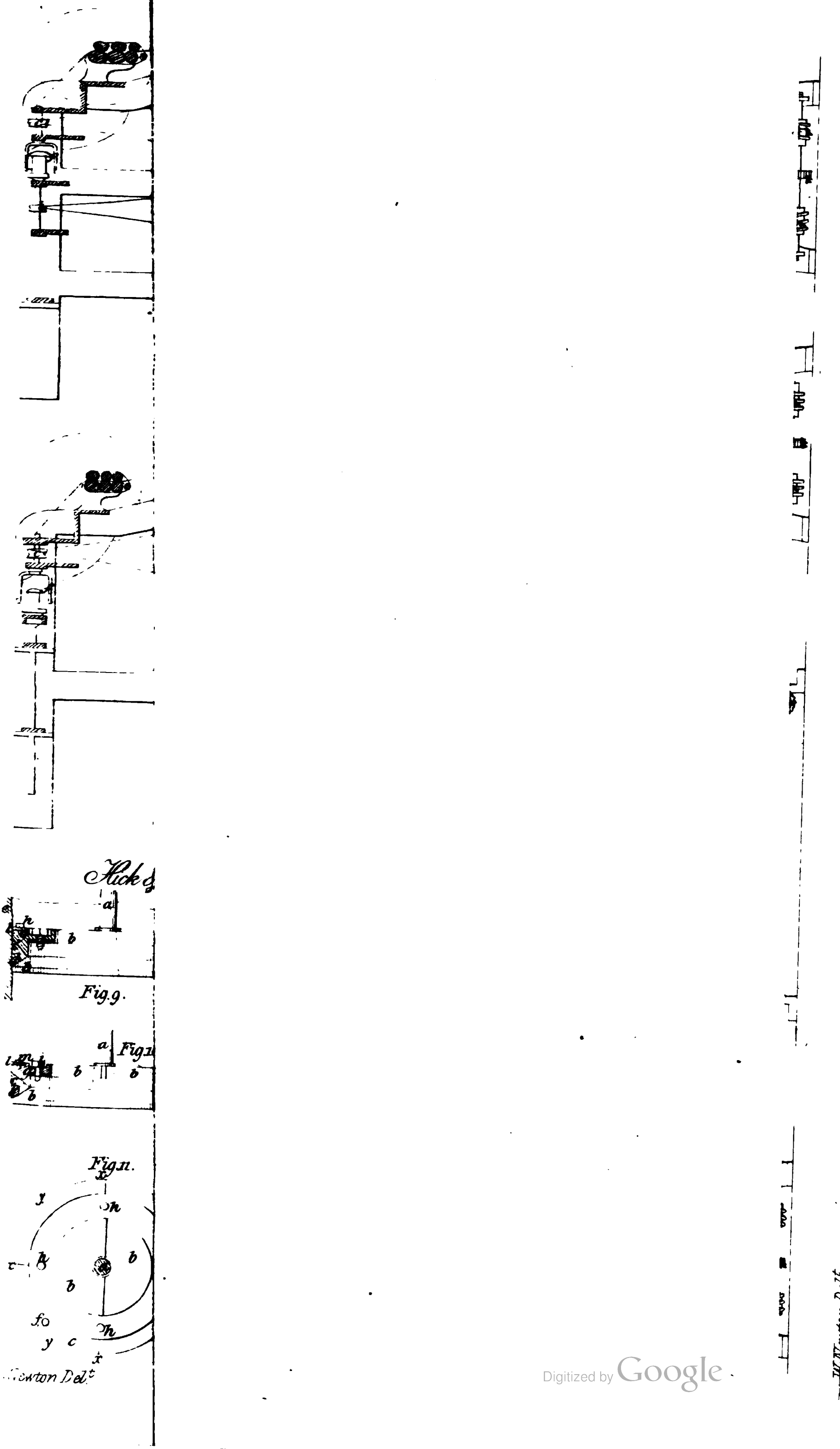

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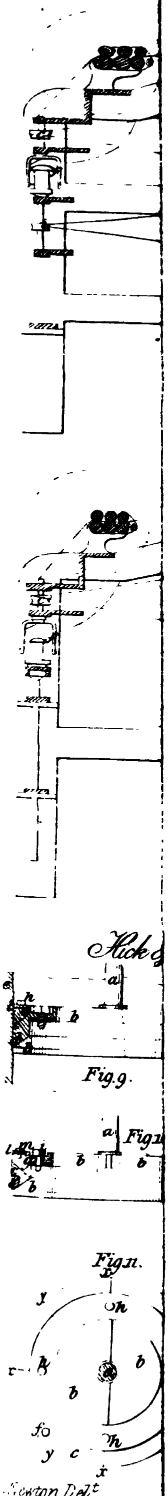

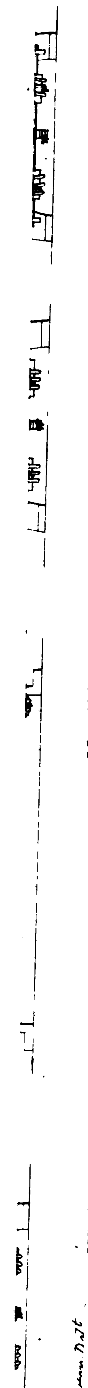

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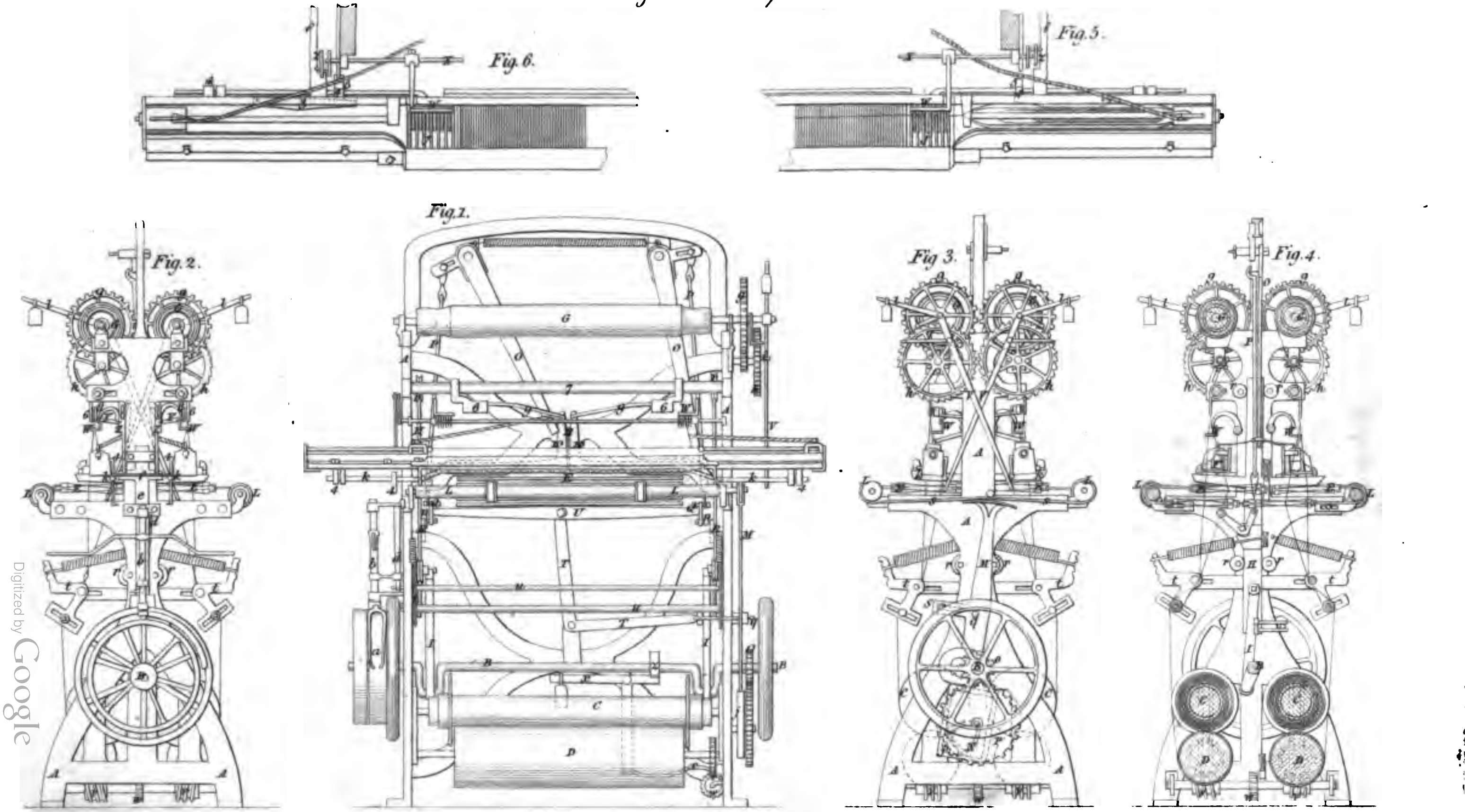
Ramsbottom & Holt's Impd. Power Loom



1 May 1835.

T. Sherratt Sculp.t

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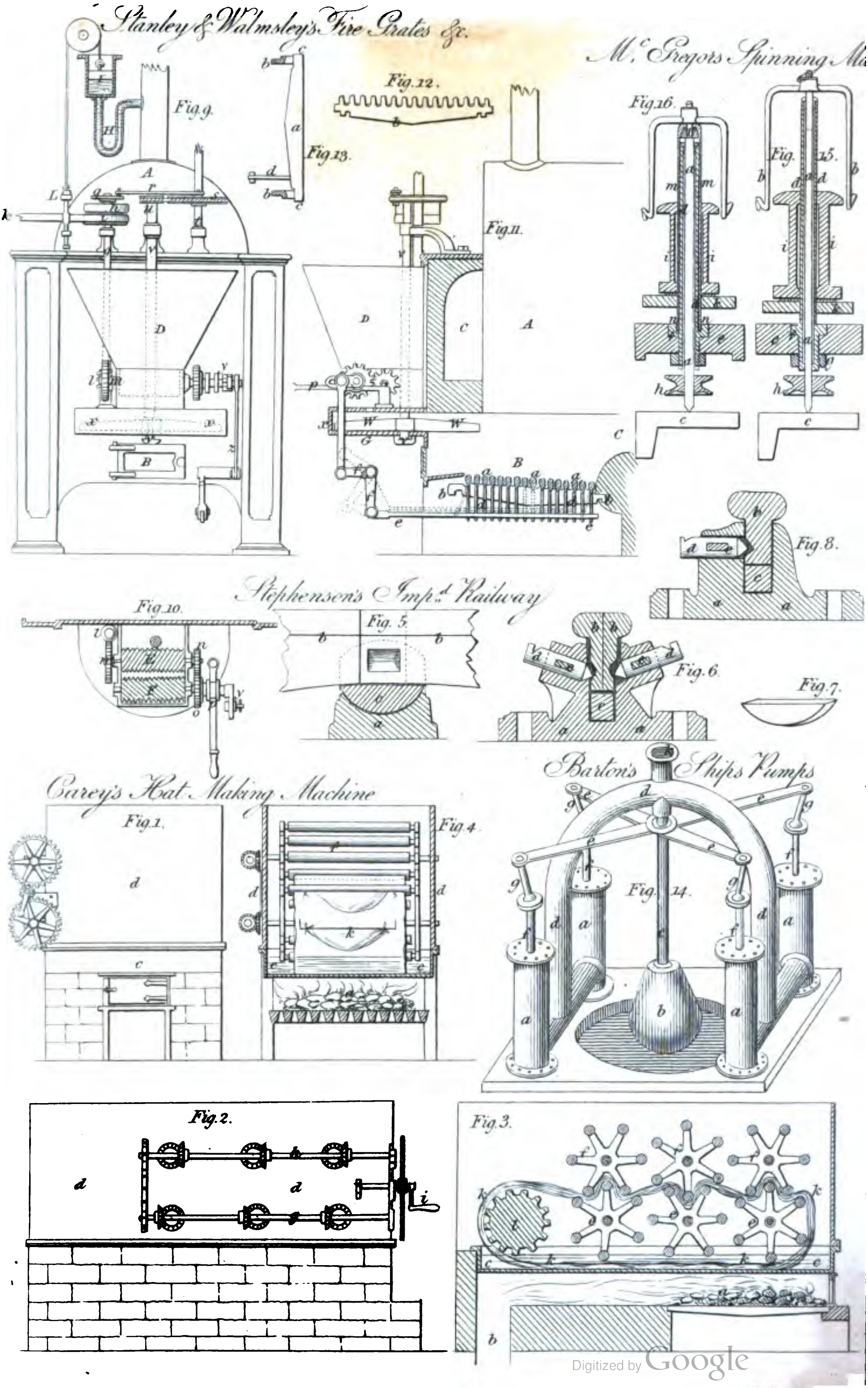

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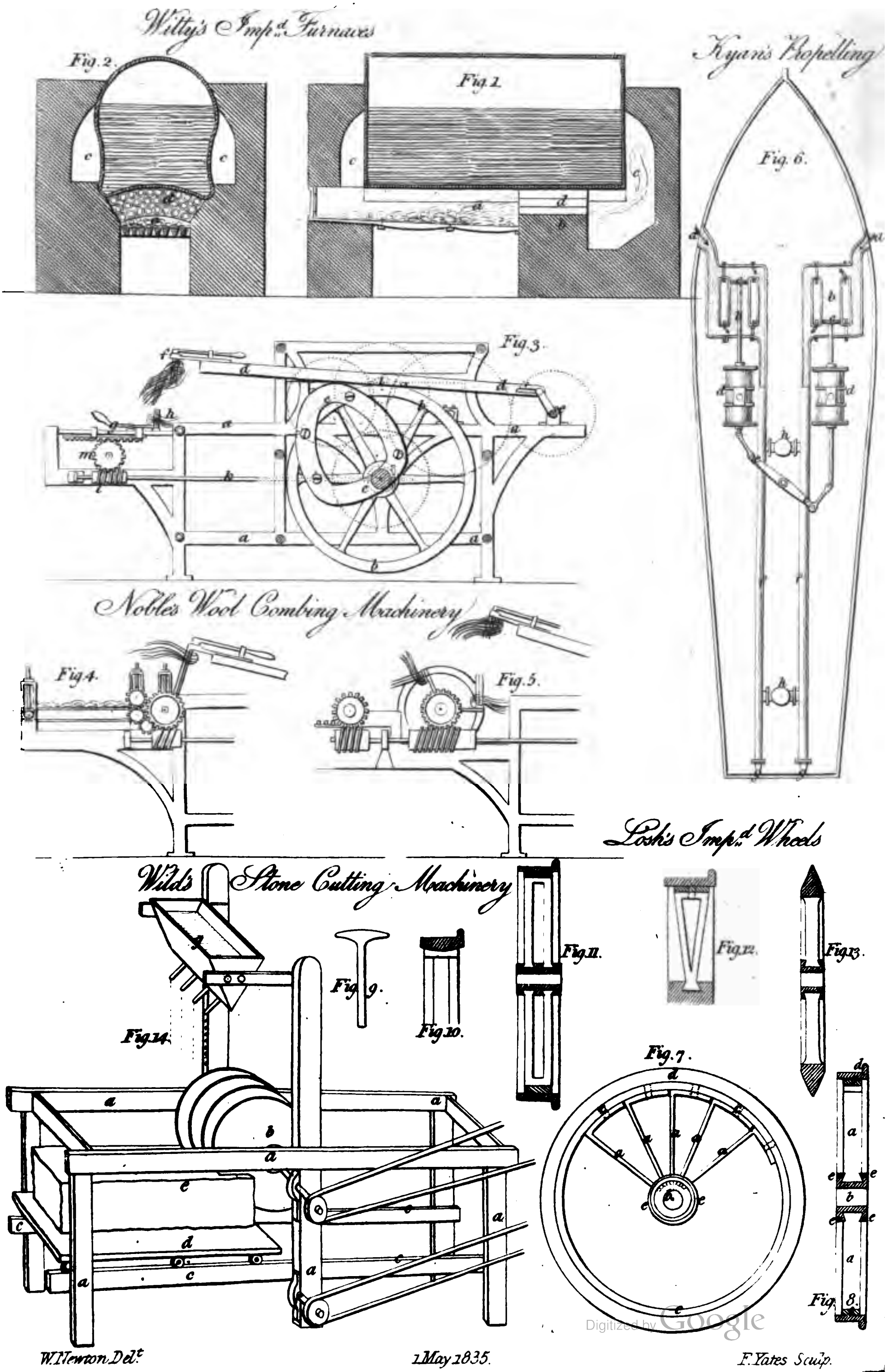

W. Newton Delt. 1 May 1835. F. Yates Sculp.

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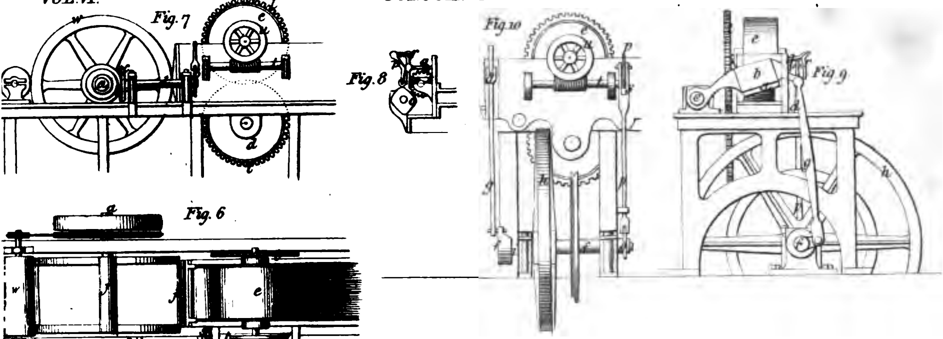
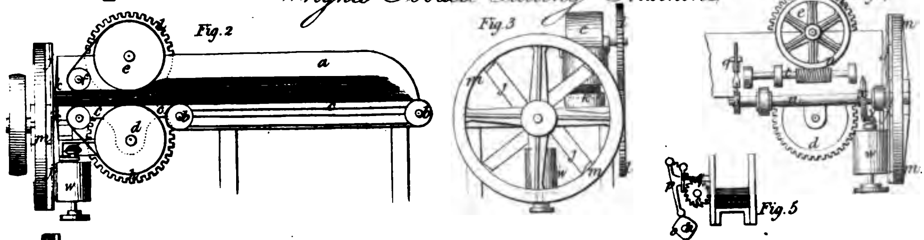
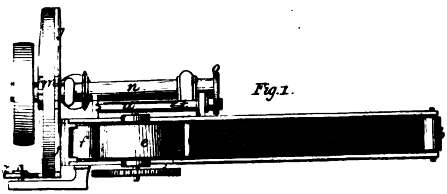
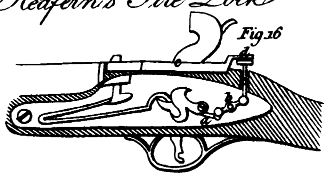


Wright's Tobacco Cutting Machine

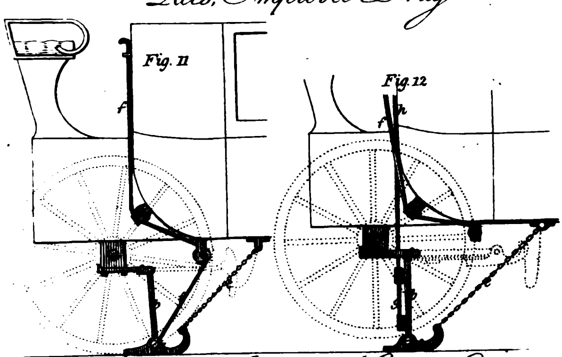




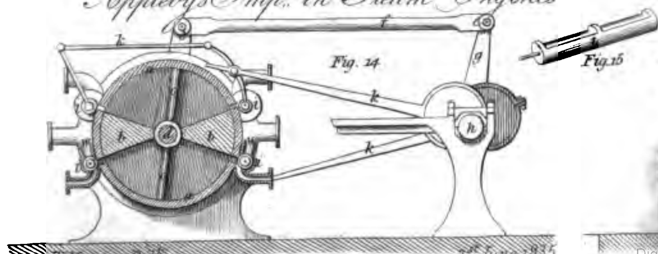
Redfern's Fire Lock

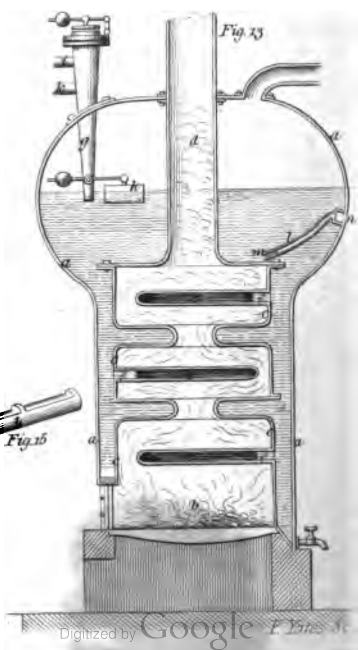


Rees' Improved Drag



Appleby's Imp^ts in Steam Engines





W. Newton Del. 1st June 1835. F. Yates Sc.

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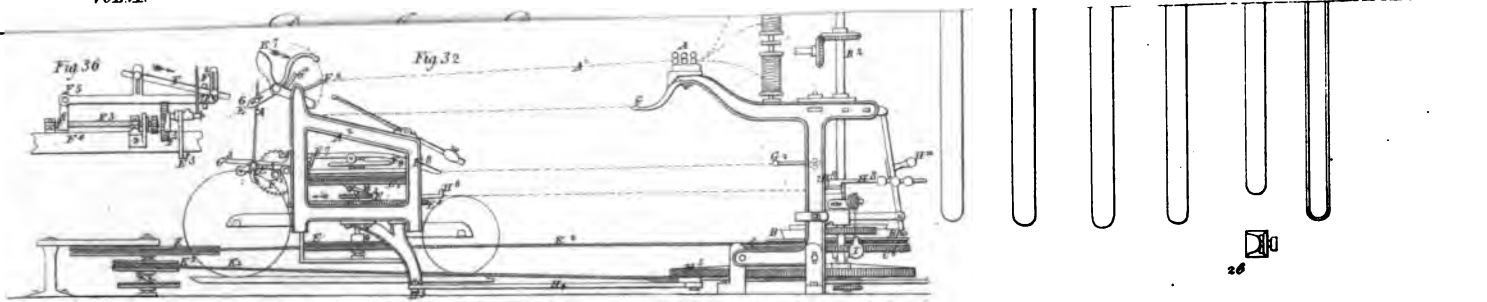

W. Newton Delt. 1. June 1835. T. Sherratt Sc.

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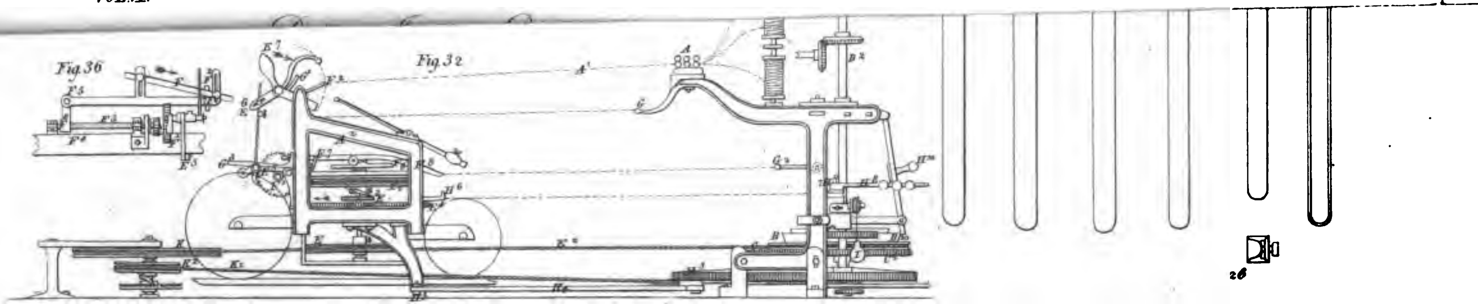

W. Newton Delt. 1. June 1835. T. Sherratt Sc.

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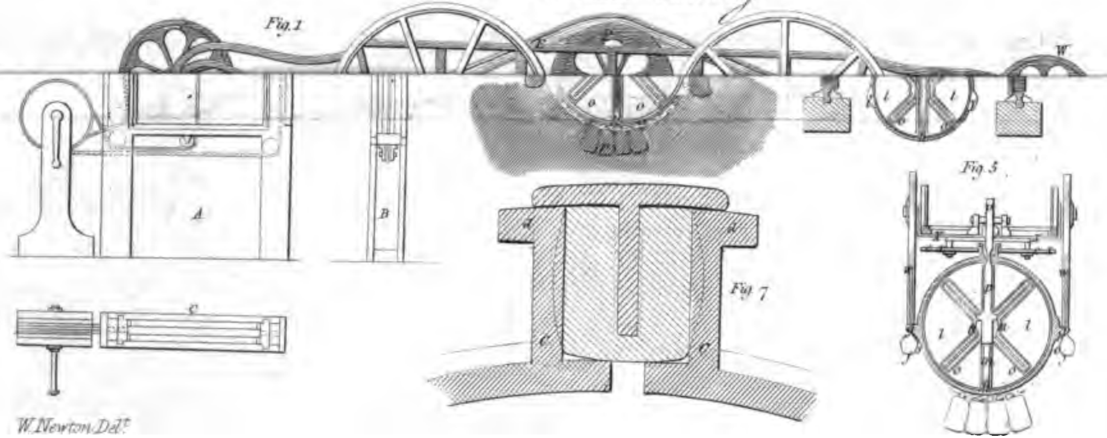
Pinkus's Pneumatic Railway



W. Newton Delt.

S. Bellin Sc.

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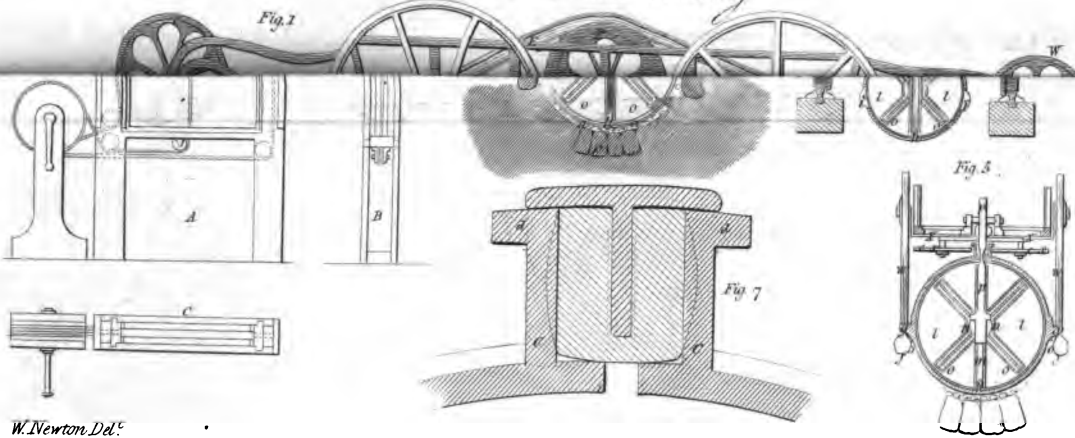
Pinkus's Pneumatic Railway



W. Newton Del.t

S. Bellin Sc.

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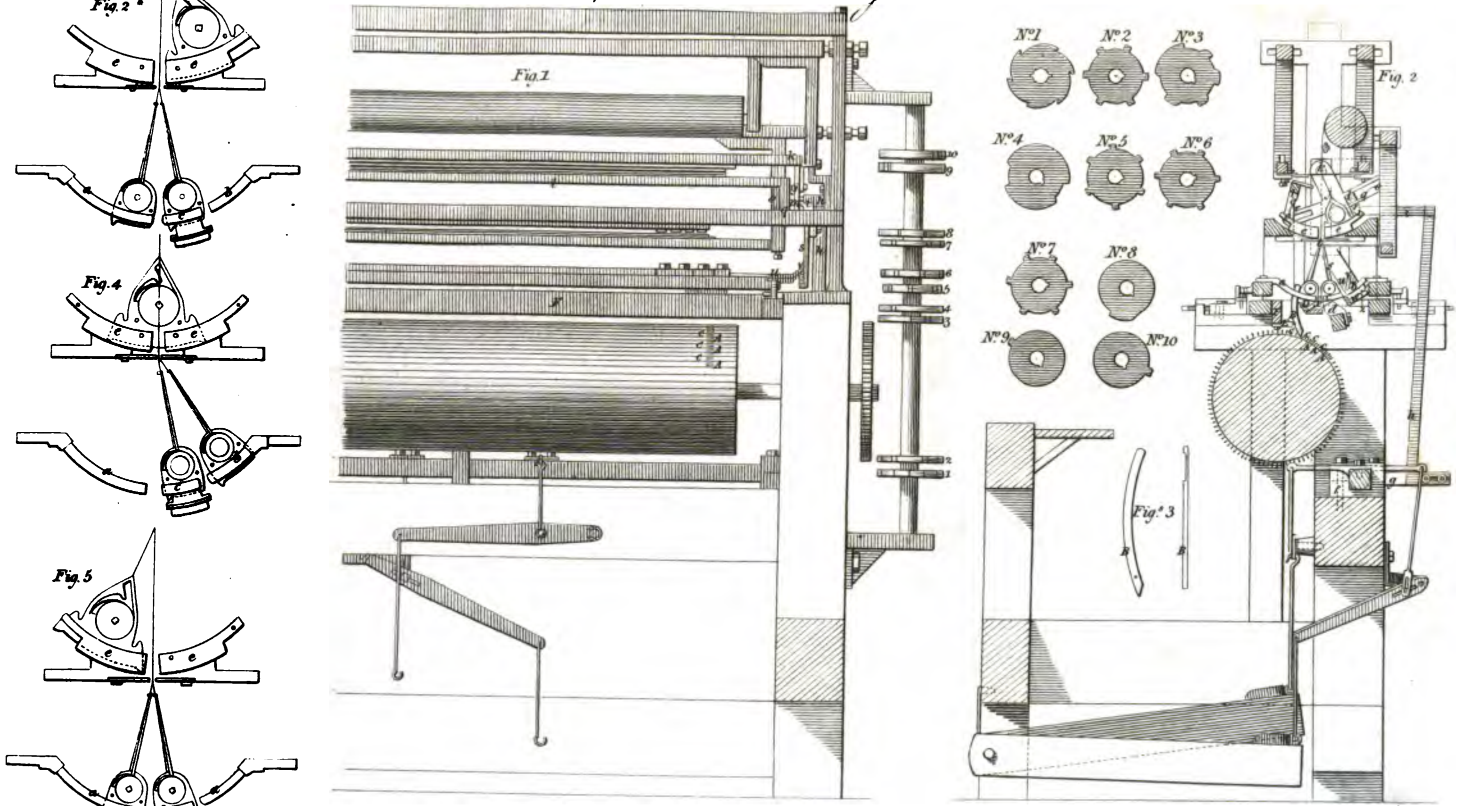
Draper's Lace Machinery



W. Newton Del.t

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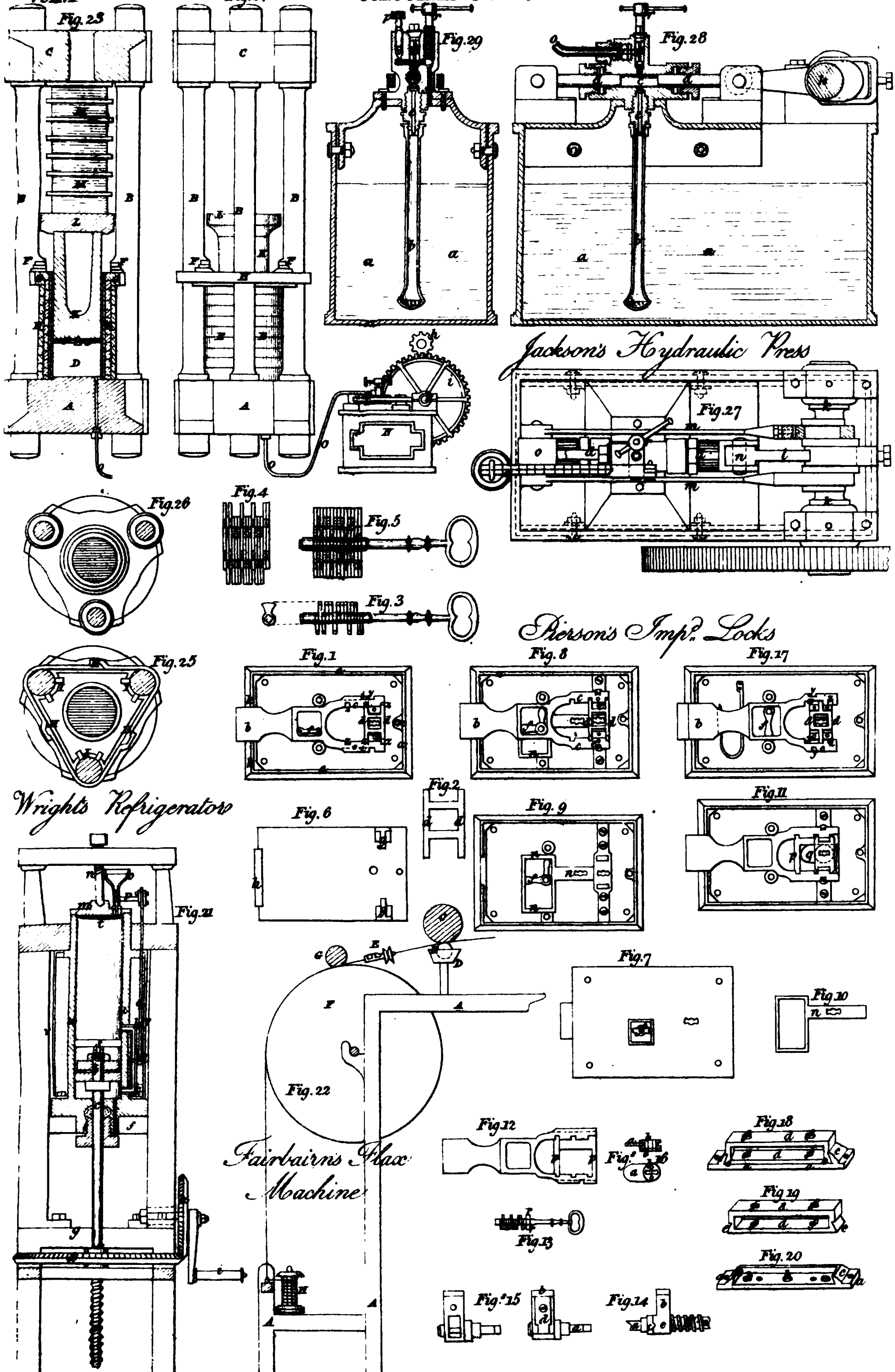

W. Newton Delt. 1st July 1835. T. Sherratt Sc.

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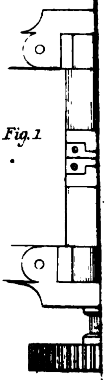
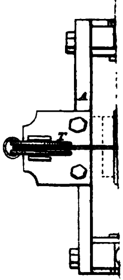
Fig. 1





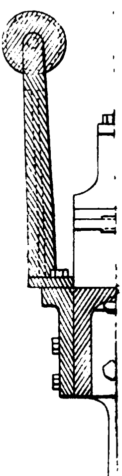
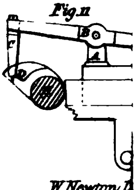
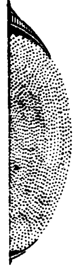


Fig. 13

Fig. 11





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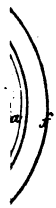

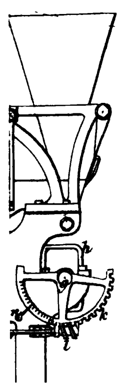

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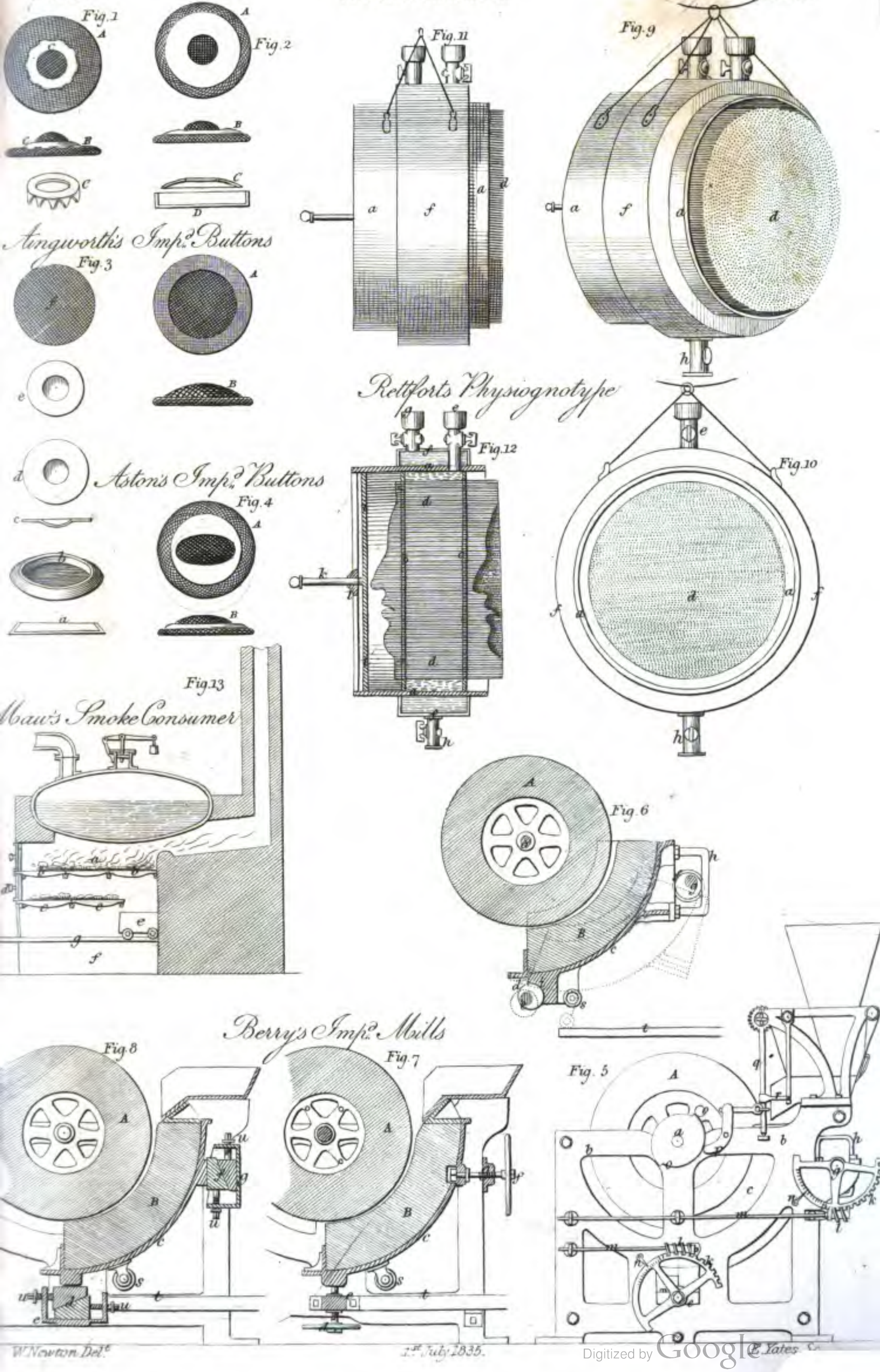

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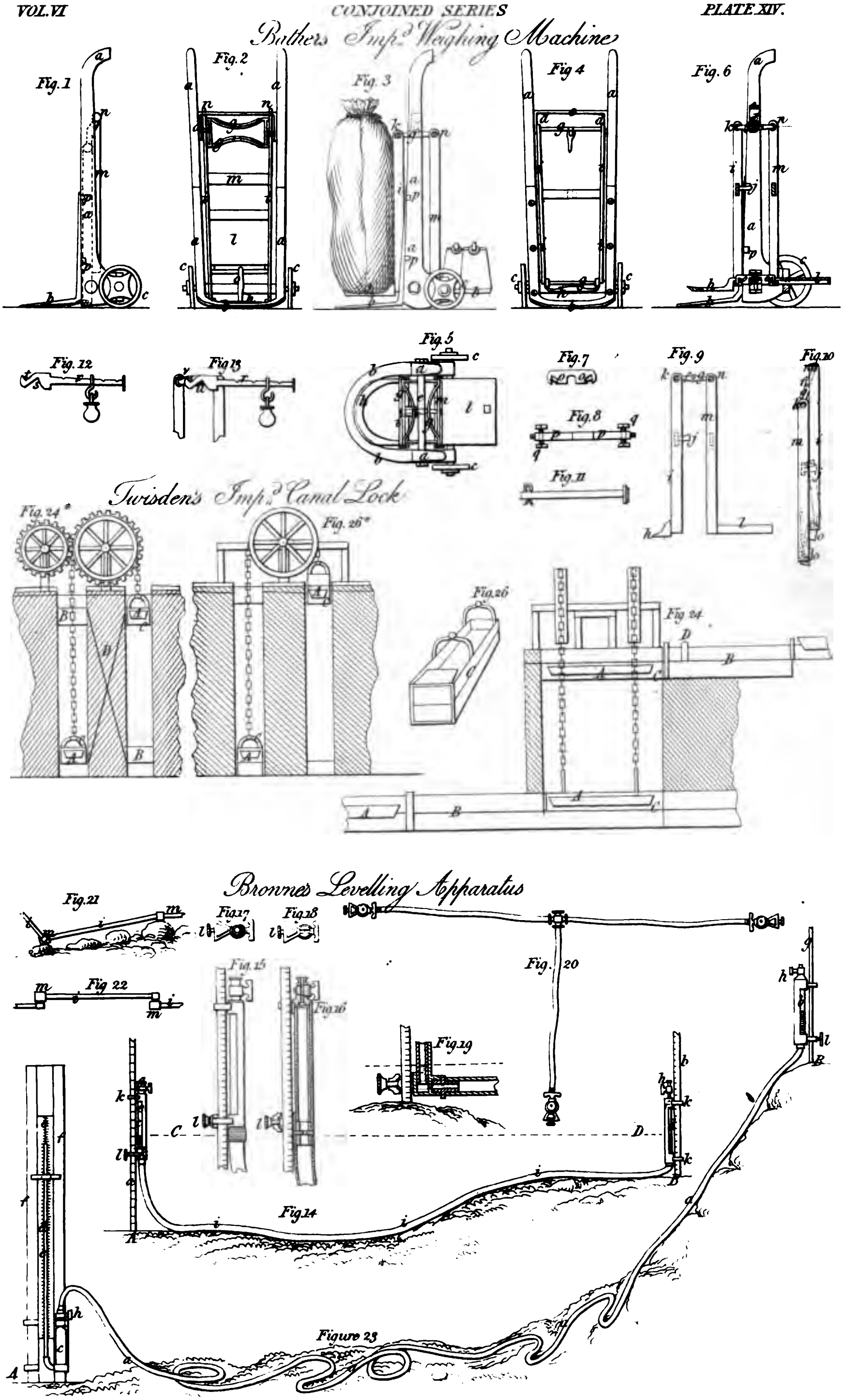

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Anderson's Canal Lock

Fig. 1

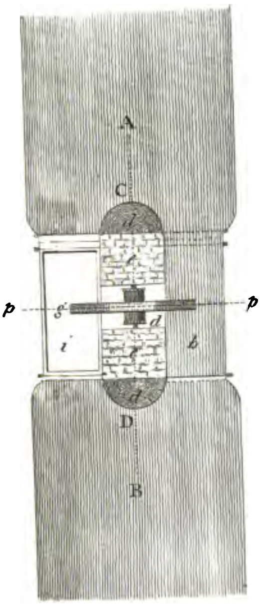
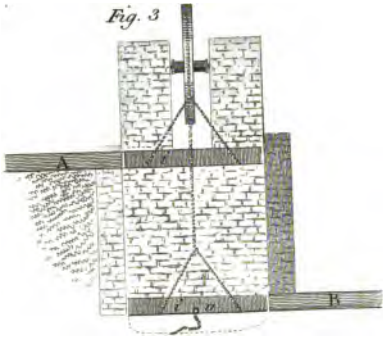


Fig. 2

Fig. 3



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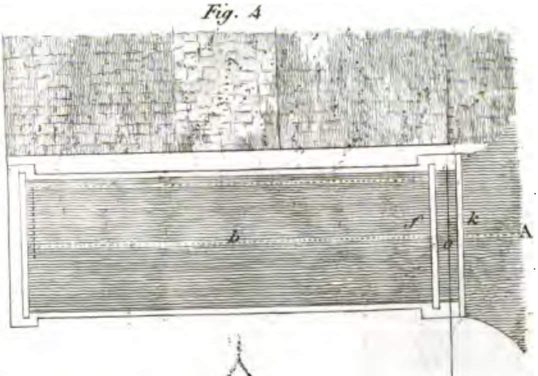

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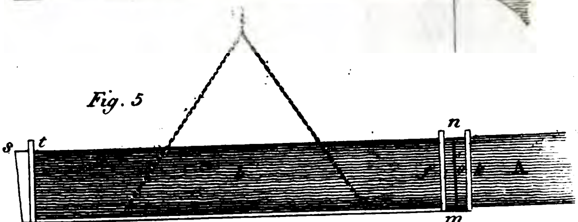

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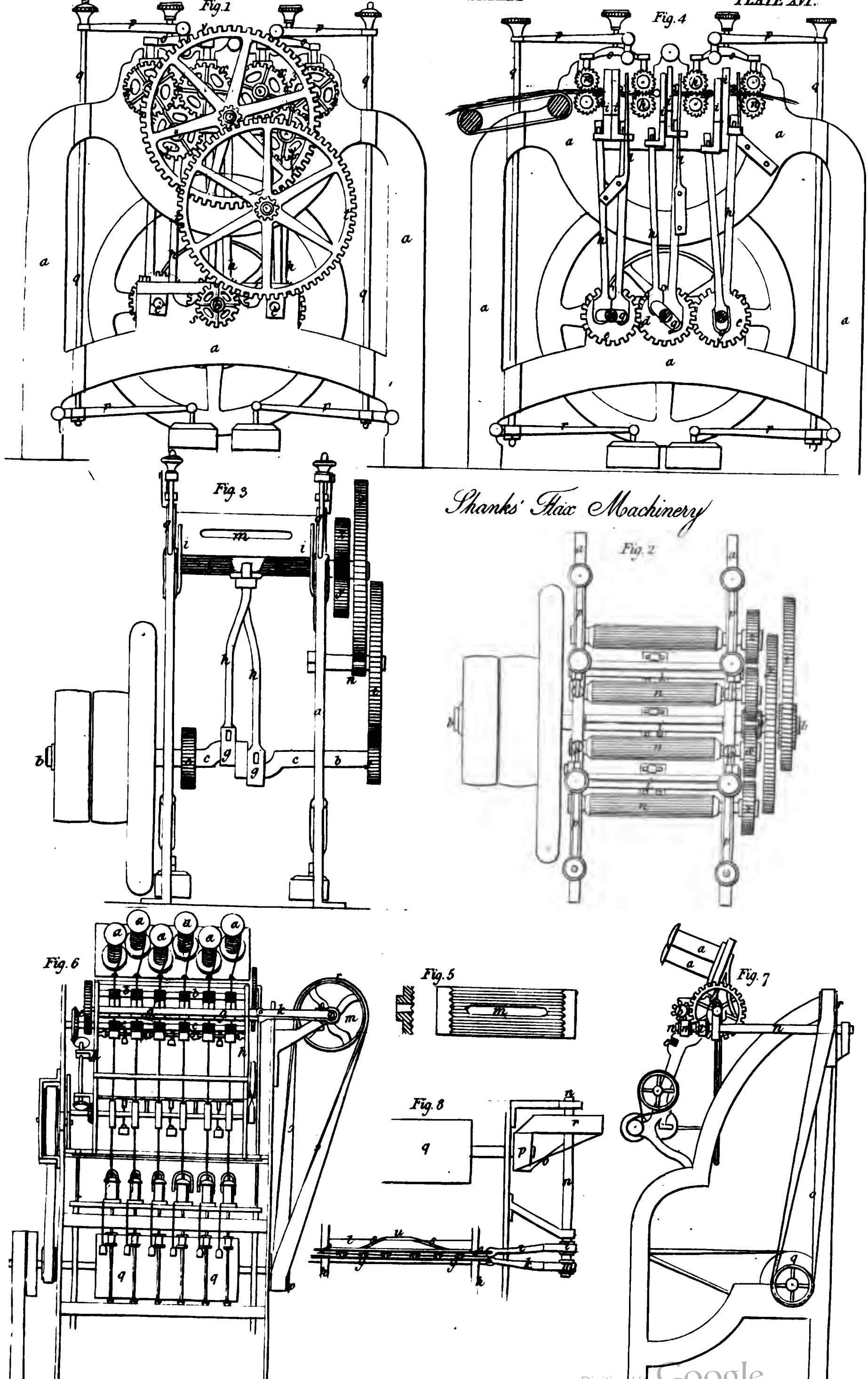

Shanks' Flax Machinery

W. Newton Del.^t 1 Aug. 1835 E. Yates Sc.

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